FOOD MANUFACTURE

Incorporating Food Industries Weekly

LEONARD HILL LIMITED, 17, STRATFORD PLACE, LONDON, W.1 — SEPTEMBER 3, 1949

Hawaiian

PINEAPPLE FLAVOUR

Never before has the true taste of luscious Hawaiian Pineapple been so perfectly reproduced as in this favourite flavouring essence by BUSH. It will endow your confections, dessert and table delicacies with a flavour both delicious and delightful . . . a flavour rich in the atmosphere of lovely Hawaii. And, remember, Hawaiian Pineapple is but one of a wide variety of BUSH Flavours renowned throughout the Food Industry for their high quality, absolute purity and amazing fidelity to natural taste.

are invited to write for
mples and particulars.

BUSH Flavouring Essences

W. J. BUSH & CO., LTD. LONDON, E.8. ENGLAND.

Noodle Soup in a Pliofilm pouch !

Flavour and aroma fully protected by world's most functional wrapper.

The first of its kind to be available to exporters, this brilliant new pouch is already helping Britain towards a bigger share of the Foreign Market. The lamination of Pliofilm and Foil is a perfect union. No air pockets to cause separation, no wrinkles to mar the smooth surface—for Pliofilm adheres readily to other packaging materials.
Very soon, it is hoped, these irresistible, sales building pouches will be available for the home market as well.

Visit our stand at the First National Packaging Exhibition
City Hall, Deansgate
Manchester
OCTOBER 5th—15th

Made of laminated Foil and Pliofilm, this important new packaging pouch has been produced by E. S. & A. ROBINSON *of* BRISTOL

FULL NATURAL FLAVOUR!

WANTED moisture sealed IN
UNWANTED moisture sealed OUT

PLIOFILM — THE WONDER-WRAPPER OF THE AGE!

- ★ *Gives 3-way protection—against air, moisture, liquid.*
- ★ *Can be heat-sealed, adding strength to the material without affecting protection.*
- ★ *Has dimensional stability, and does not easily wrinkle or crack.*
- ★ *Withstands all the stresses involved in automatic or semi-automatic packaging.*
- ★ *Is manufactured in grades and gauges suitable for every type of product.*

Pliofilm *by*

GOODYEAR

Send your enquiries to :—PLIOFILM, DEPT. (F.M.), GOODYEAR, WOLVERHAMPTON.

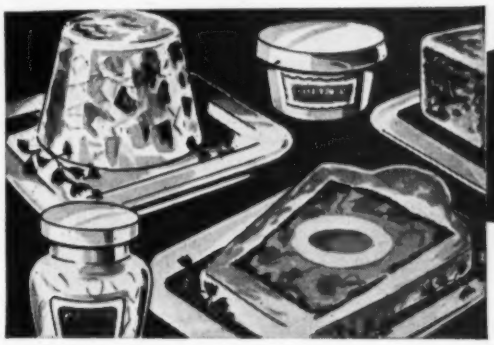
FOOD MANUFACTURE

Vol. XXIV. No. 9 · Published Monthly · September 1, 1949

CONTENTS

	Page
Editorial	385
Gas and its Use in Fish Canning. *A. E. Marshall*	389
Wining and Dining	392
Detection and Measurement of Foodstuff Spoilage. Part 1. *R. W. Moncrieff*	393
Cherry Varieties	395
S.C.I. at Manchester	396
Heat Penetration in Cans and Jars	398
The Grape Industry in California	399
The History of Nutrition	403
Tomato Juice in Cans. *Basil C. de Guerin*	405
Statutory Instruments	406
Locust Bean Gum. *C. Griffiths, A.M.C.T., A.R.I.C.*	407
Feeding through Five Centuries	410
Oysters all the Year Round	412
Preservation of Fruit Juices with Less SO_2. *K. Vas and M. Ingram, M.A., Ph.D.*	414
Personal Injuries Legislation	417
Trade News	418
Information and Advice	431
Recent Patents, Trade Marks, and New Companies	432

Published by Leonard Hill Limited, 17, Stratford Place, London, W.1. Mayfair 7383.
1 year $4; 2 years $6.50; 3 years $8. Sterling rates: 1 year 20s.; 2 years 30s.; 3 years 40s.

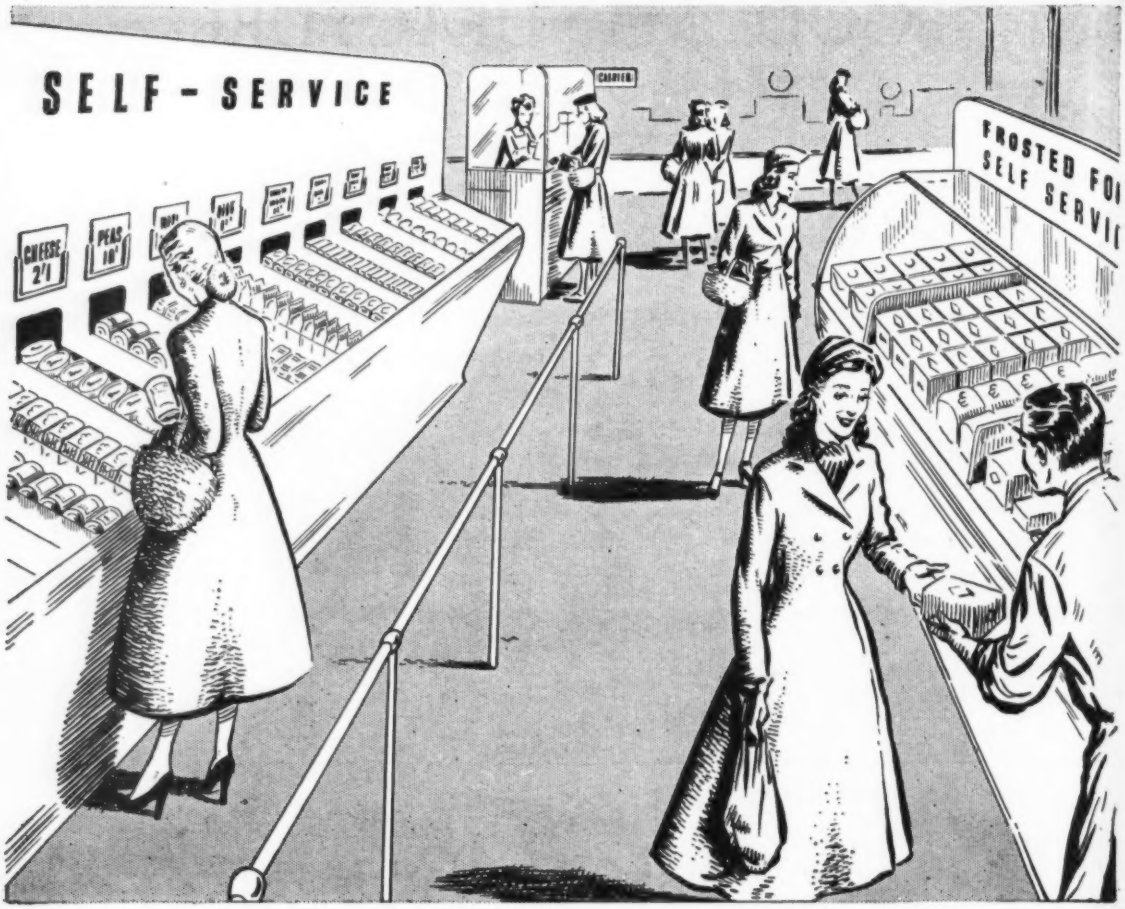


PURE GELATINES
POWDERED or KIBBLED

Laboratory Controlled
Perfect Keeping
Qualities
Standardised Grades
Absolute Uniformity
in Deliveries
Samples & Prices
on application

A bright sparkling Jelly can only be made from a Gelatine of good strength, clarity and colour. All our grades are tested strictly according to the methods of the British Standards Institution and standardised to a definite specification.
Our Gelatines are also submitted to the most exacting laboratory tests to ensure complete freedom from harmful impurities.

OURY, MILLAR & CO LTD.
THAMES HOUSE, QUEEN STREET PLACE,
TELEPHONE:- CENTRAL 2672 LONDON, E.C.4. OLMENTH-CANNON LONDON



Fisher's Foils

for modern packs...

PROTECTIVE

HYGIENIC

ATTRACTIVE

Just around the corner—encouraged even in official circles—is the Retail "Automat." Frozen Foods in self-service refrigerated display counters — canned and packaged foods on gravity conveyors—such is the shop of the future. Packaging cannot lag behind. Among the newest, most appealing materials for modern packs is *aluminium* foil in scintillating embossed designs. They can—they should be carrying YOUR NAME to the point of sale—and beyond. Sheet Aluminium is also available for rigid Containers. Write or telephone for sample range.

FISHER'S FOILS LTD., WEMBLEY, MIDDLESEX

Telephone: Wembley 6011. *Telegrams: Liofnit, Wembley.*

FOOD MANUFACTURE

Vol. XXIV, No. 9 September 1, 1949

The World's Food Supply

AS a corollary to our leader in the July issue of FOOD MANUFACTURE we quote some refreshing remarks made in an article by Dr. M. K. Bennett (*The Scientific Monthly*, LXVIII, 1, 17).

He says: "Pessimism about maintenance or improvement of *per capita* food supply, even where population is densest, is not intellectually necessary, not compelled on the basis of historical fact or logic. We know approximately what the trends have been. More important, enough is understood about the powerful forces lying behind economic productivity and dietary improvement to warrant the statement that the ultimate productivity of the earth's surface had best be regarded as incommensurable and elastic, not fixed. It can be measured, and thereafter set in relation to a future growth of population itself not firmly predictable, only in terms of surface—square miles or square feet. The customary but spurious quantitative exercise—only 4 billion cultivable acres now, less than 2 acres per person, with 2·5 acres estimated to be required per person to provide a minimum adequate diet, and with population growing while soil is washed away—ought not to mislead. The possible product of the earth defies measurement even on the assumption of stagnant technology, and the assumption itself gains no support from history.

"Time may prove today's pessimists to have been right in their attitude; the actual outcome remains to be seen. But if they prove right, the historical reasons are quite unlikely to be limited to an over-rapid increase of population set against an over-rapid destruction of soil resources."

Home Meat Production must be Increased

The policy of the present Government in the matter of meat production at home was energetically attacked by the Rt. Hon. Walter Elliot, M.P., in a recent article in *The Daily Telegraph*. Mr. Elliot, who was Minister of Agriculture 1932-1936, said that we were producing in 1938 one and a quarter million tons of meat a year and today less than 800,000 tons, which is a bigger drop than the whole of the Argentine annual meat shipments.

The Government target for home production of meat is still 7 per cent. below pre-war in beef, 30 per cent. in mutton and lamb, and 50 per cent. in pig meat, while the proposals for 1952 and 1953 show a considerable drop below pre-war.

With regard to imports, the picture may easily be a shortfall of something like 250,000 tons below the pre-war totals.

Mr. Elliot points out that the raw material of beef and mutton, lamb, and veal is grass, and that grass is the greatest crop grown in this country; he puts it forward as a constructive policy that Ministers should allow the grass to grow under their feet—actually not figuratively.

He considers it necessary to hammer away in the hope of impressing upon Ministers that more meat can be produced in this country since half a million tons more was being produced before the war, and suggests that the first concentration should be made upon pig meat. Apart from that, more of the world crop of maize must be secured. Grassland improvement would produce more food for the grass-eating animals, and would save exchange which could be used to purchase more grain for the animals which do not eat grass, also for extra feedingstuffs for the animals which do.

An authoritative review of the whole livestock position is necessary to determine the balance to be held between various branches of livestock farming, notably between meat and milk, in view of the prospect of short and even shorter commons with higher and even higher prices now opening out before us.

A note of warning is sounded in connexion with fish supplies, and Mr. Elliot deplores the "same reckless and improvident conduct which is now evident in the management of the land resources of our island actively in progress in the conduct of Ministries towards the resources of the sea." In order to avoid the continuance of the deterioration in our position it is at home that the shortages will have to begin to be cured.

Mayonnaise Spoilage

An investigation of mayonnaise spoilage carried out by M. D. Appleman, E. P. Hess, and S. C. Rittenberg, of the Department of Bacteriology, University of Southern California, demonstrated the presence of *B. subtilis* and a yeast in the product. A survey of the production plant revealed sufficient unsanitary conditions to warrant the conclusion that gross contamination was the contributing factor to the spoilage of the product (*Food Technology*, **3**, 6, 1949).

The spoiled jars showed a slight separation of the product, and were characterised by an "off" or slightly "yeasty" odour. The yeast was tentatively identified as a member of the genus *Saccharomyces*.

As a result of tests on the raw materials, it was found that only the egg and spice had appreciable bacterial populations and only the latter contained enough spore formers to be significant.

A general sanitary survey of the plant and equipment was undertaken by means of swab tests, which showed contamination sufficient to cause spoilage even in such a microbiologically resistant product as mayonnaise.

Food Preservation Investigations

The results of ten years' research are contained in a special quarterly issued by the Central Food Preservation Research Laboratories for the Council for Scientific and Industrial Research at Homebush, New South Wales.

Pioneer investigations were carried out on the effects of the rate of freezing on the formation of "drip" from frozen and thawed beef muscle. This was virtually eliminated by fast rates of freezing such as can be obtained by freezing relatively small pieces of beef in liquid media at temperatures lower than −40° F. The results showed that this method could not be used in normal units such as beef quarters.

In the Division's meat preservation laboratory, established in Brisbane in 1932, the major assignment was to define conditions of handling, cooling, storage, and transport of chilled beef which would prevent deterioration during a normal voyage of about fifty to sixty days.

The Brisbane investigators based their studies on those of workers at the Low Temperature Research Station, Cambridge, who discovered that the use of a storage atmosphere containing 10 per cent. carbon dioxide considerably prolonged the life of chilled beef.

Adoption of the recommended techniques by the Queensland meat works and the refrigerated ships resulted in the successful carriage of gas-stored chilled beef to Britain.

Since the formation of the Canning Section in 1940 numerous bacteriological and chemical studies have been made on problems arising in the preparation of canned meat packs, particularly those containing cured pork.

The research work in progress on meat preservation includes investigations on the accelerated ripening or conditioning of beef, fundamental and applied studies on the loss of bloom in chilled beef, and the sterilisation of meat storage spaces by aerosols.

Among other investigations carried out were those on commercial canning of orange juice, on the canning of fruit and vegetables, on fish preservation, and on quick freezing.

This Year's Harvest

At the time of writing there is a cautious optimism about the prospects of this year's harvest in Europe. The rains of May and June gave definite promise; but the swing to drought, that closely followed them, is already giving some cause for apprehension, especially in the western countries. Whatever be the final outcome of this curious year, it looks certain that bread grains and potatoes will both fall below the 1948 level. This is not altogether satisfactory. Britain's 1948 wheat crop fell below the target hopefully set by the Government; the chances are that 1949 will take us below even 1948.

France is reported to have a potato acreage at least 5 per cent. below that of 1948; and a decline in the production of bread grains of somewhere about that level is expected. On the other hand, crop conditions in the Scandinavian countries have been reported as favourable on the whole, with an increased acreage and reasonably good grazing. Poland and Czecho-Slovakia also seem to be satisfied with their prospects; and it is clear that between them these eastern countries have managed to arrange some useful barter agreements.

The droughts of the early spring probably did more damage in Rumania and Bulgaria, though their incidence was by no means evenly distributed over the countries. The grain crops of Hungary and Russia, more important for Western Europe, are said to show fairly good promise. There were unfavourable weather conditions in Russia during the sowing of some of the grain crops and of the sugar beet; but reports suggest that, in spite of this, the targets were reached.

At the moment it is too early to anticipate what prospects we have of getting coarse grains

from the eastern countries in the coming winter. The Yugoslavs indicate that they hope for a better crop than last year; and it is possible that Hungary will be able to offer considerable quantities of maize and barley.

As a whole in Europe coarse grains are not likely to show much increase over 1948; the hay crops in some countries were stated to be promising well. The general impression is that the Continent has not yet gone very far in the direction that will ultimately make it free of dollar commitments for some of its food. While conditions in Germany, for example, have certainly improved over last year, the continuing shifts of population make it almost certain that the country will have to rely on grain imports from the other side of the Atlantic, at all events in some parts of the western zones.

Food and Container Problems

A statement on some unsolved food and container problems of the Armed Forces was made at a recent meeting of the Associates of the Food and Container Institute, U.S.A. One problem was the modification of canned meats; available products are considered to have an undesirable canned meat flavour and mushy texture. Storage life requirements are at least six months at 100° F. It was also considered that sixty canned meat items were required that would possess distinctly different flavour, texture, and appearance characteristics.

Another problem discussed was the development of an acceptable sterile canned ham with a storage life of six months at 100° F. Mushy texture and undesirable canned meat flavour were considered major defects of all canned sterile hams produced to date and products showing a minimum of heat damage were required.

In connexion with dehydrated meats, the problem was the development of precooked products with storage life of at least six months at 100° F. Dehydrated meat products which would possess flavour, colour, and texture comparable with fresh meats, prepared in the same manner, were required.

The development of flexible packaging materials and procedures for use in packaging processed meats needed investigation. Certain available materials, such as a rubber hydrochloride and copolymer, vinylidene chloridevinyl chloride, will withstand commercial sterilisation treatment of at least 240° F. for varying lengths of time up to 90 minutes and show promise of usefulness in the flexible packaging of meats.

Other problems discussed were the provision of acceptable, ready-to-use, frozen meats with a storage life of one year at 0° F.

Animal Diseases and Food Losses

The seriousness of the food losses incurred in Britain through animal diseases was stressed by Lord Boyd Orr at the International Veterinary Congress held in London recently. It was estimated that 70,000 tons of carcass meat and 40,000 tons of poultry meat were lost annually in Britain. Dairy cattle diseases cost about £30 million, representing 200 million gallons of milk a year, although these were already being curtailed by virtue of new methods of control.

Attempts at the cleaning up of dairy cattle to eliminate tuberculosis have been intensified lately, but these efforts are still a long way from success, whereas tuberculosis has been practically eliminated from the United States and sundry other countries.

Lord Boyd Orr advocated a strong international organisation for the veterinary profession linked with the FAO. If animal disease control could be organised on a world-wide basis, the amount of dairy and meat products for human consumption could be enormously increased. He was of the opinion that modern agricultural and engineering science could double world food output in less than twenty-five years if governments would co-operate.

Oyster Research

"It is a wery remarkable circumstance, Sir, that poverty and oysters always seem to go together." So said Sam Weller.

This year's oysters from Colchester are likely to be scarce and the price about £5 a hundred, which emphasises the difference between Sam's day and ours.

The recent history of oyster culture is depressing, at any rate to those who are partial to what old-time masters of the *cliché* insisted upon calling "the succulent bivalve." There occurred a *débâcle* in the Essex beds in 1920-1921 when for no ascertainable reason there was a high mortality rate. A gradual recovery took place, but serious set-backs were again produced by the hard winters of 1940 and 1947.

Oyster production in the River Blackwater fell from ten millions in 1918 to 131,000 in 1948. Measures for remedying this state of affairs are being taken in the laboratory of the Ministry of

Agriculture and Fisheries at Burnham-on-Crouch by a group of young marine biologists who are keeping observation on the oyster grounds along ten miles of the Crouch and Roach rivers.

The main object of their studies will be that of factors controlling the formation of young oysters. Other matters for investigation will include the use of artificial collectors, control of imported pests, use of mechanical dredges and pits for reducing winter mortality, and development of a purification process.

The Essex oyster has serious enemies, one being the American whelk tingle which at present is destroying 75 per cent. of the newly formed oysters. Other pests are the American slipper limpet and the New Zealand and Australian barnacle which has spread to all British producing grounds.

The Art of Writing

The discussion at a meeting of the section of epidemiology of the Royal Society of Medicine a few months ago on scientific reports should be stimulating to writers, and, presumably, make-up men.

One of the speakers said that, armed with self-knowledge and a big blue pencil, knowing and believing in his subject, any man could write a report worth reading. Other advice was to avoid mixed metaphors, to pick the type, to see the proofs in galley, and to place illustrations as carefully on the page as though a picture was being put on a wall. He would always put statistics at the end of a report, except for a few essential figures in a neat cage, or a graph. He added that the ordinary reader could not stand more than two lines in a graph!

Another speaker passionately defended statistics. He thought that there existed people who, if spoken to in glowing terms of Jacob's ladder, would ask the number of steps and would not be fobbed off with a picture. So far as graphs were concerned, they could be used to supplement a table if they made things clearer, but figures were fundamental. The careful manipulator of graphs could make the unwary believe anything. He was an advocate of tables. Somewhat surprisingly, he said that some people like to read them.

During the meeting were given a number of recipes for writing a good report. According to one of these, the writer must first decide whether the report is necessary at all, but once it is undertaken it should be comprehensive and kill the subject stone dead. No afterthoughts were admissible.

The advice of one lecturer is worth passing on. "Begin with a long historical introduction and scrap it; write the body of the report, putting down all your data and scrap that too; write a discussion and keep it; write a summary of your discussion, sleep on it; if you think it worth while, get it published."

There are, of course, many other pitfalls besetting the less expert or would-be writer but, to start with, the advice of the epidemiological gentlemen may be taken to heart with advantage.

Ozone—Fact and Fiction

While less attention than it merits has been given to ozone as an efficient deodorising, preserving, and sterilising agent for foodstuffs, as an inhibitor of taint and mould growth, as one which leaves, after reaction, oxygen in lieu of undesirable end-products, the opposite is the case where the everyday Press is concerned.

Summer is here again; so what matters the technologist's talk of ozone *versus* chlorine in water sterilising, of ozone converting isoeugenol prepared from clove stem oil into artificial vanillin, of ozone's possibilities in maturing tobacco, in air-conditioning of slaughterhouses, offal works, and in other "offensive trades"?

The myth of unrationed ozone at Blackport or Shrimpton-on-Sea rises phoenix-like at the columnist's bidding. What matters the warning in a Royal Society paper that a few parts per million reduces respiration metabolism and is breathed at risk, or even analyses proving that only on high Alps can concentrations reach one part per hundred million? The Greek name for "smell" proves a magnet as potent as talk of sea and sand, or the urge to find what the wild waves are saying.

Against the Chicago experiment claiming increased chest measurements for bank clerks working in an ozonised atmosphere, or the St. Louis children free from tonsillitis and common colds, or even London's tube train drivers equally immune, there is much evidence to the contrary as to ozone's virtues.

Schönbein's ozone has possibilities in food industries, especially with British firms to the fore in design of ozone generators. But as for the ozone ration referred to even in national newspapers, we remain sceptical, replying to the columnist with that story of "eleven saddle horses" which "ran up against a south wind very powerful and rich in ozone, causing contracted inflammation of the lungs so that most of them died."

Gas and its Use in Fish Canning

A. E. MARSHALL,

South-Western Gas Board, Plymouth and North Cornwall Sub-Division.

The bottling of fruits and pickles for which gas-fired boilers and pans were used led Mr. Russell of Kendies Foods to explore the possibilities of canning pilchards by similar methods. To reach an output of 8,000 to 10,000 cans per day, plant capable of producing 1,200 lb. of steam per hour was required, to supply which it was decided to use gas as the source of heat.

THE general run of pilchards is from June to January or February according to weather. The fish usually appear off Land's End during June, July, and August; they travel up-Channel until January and February, when the spawning season commences. During spawning, and immediately after, it is not considered advisable to catch the fish for canning as there is considerable deterioration of condition, particularly in respect of oil content.

Well-nourished fish, caught in the Channel, are unloaded at various points in the south-west, and Plymouth is fortunate inasmuch as the drifters use the port as a centre for activities during the season. It is essential for the production of good packs to process the fish within twenty-four hours of the catch, although the fish is sometimes stored in ice for a few days before using. This system is adopted to give continuous work in the factory on the days when the boats are kept in port, owing to weather conditions.

Factory Operations

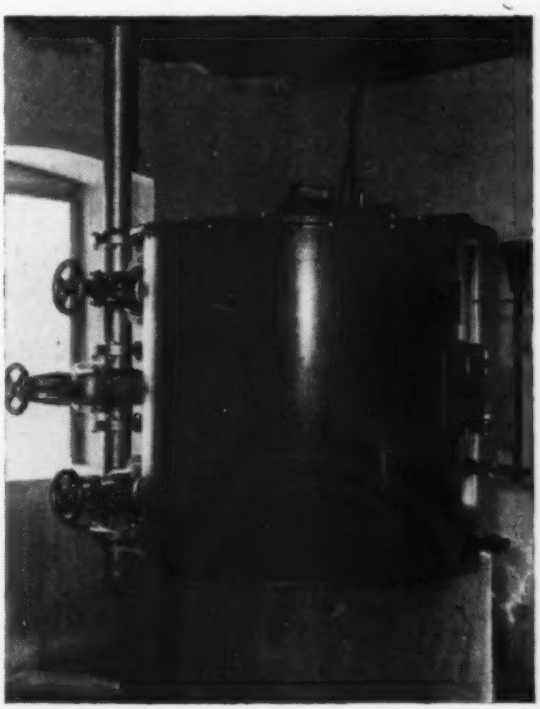
The pilchards are unloaded at the factory and delivered direct to the nobbing and gutting department, where a number of women experts detach the heads, tails, and entrails. This is an extremely specialised job, which is being transferred from manual to machine operation during the next close season.

Following this operation the fish are washed in an electric rotary washer with a capacity of six stone of fish per operation for five minutes, when all scales and extraneous matter are removed.

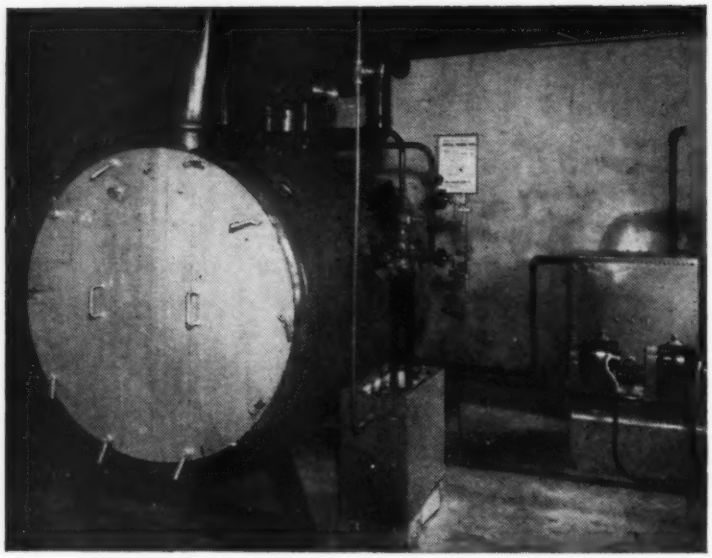
The pilchards are then soaked in brine of 24° Baumé strength for a period of fifteen minutes. After draining, the fish are conveyed by chute to the packing floor. The cans, to which the necessary quantity of tomato *purée* has already been added, are then packed, weighed, and placed on a travelling conveyor with lids loosely in position.

At the end of the conveyor the cans are received by an operator, and loose covers clinched. The machine at present installed is semi-automatic, with a capacity of approximately thirty cans per minute.

The cans then enter the exhauster, for what is perhaps the most important operation, as it is essential to remove the gases existent under the skin of the fish to prevent deterioration of the finished product and "blowing" of cans. The exhauster is of box type with continuous metal sole conveyor, 300 feet in length, with a capacity of 950 A1 Tall cans, with a delivery rate of forty-seven per minute or 470 oval cans at twenty-four per minute. The box is 24 feet long by 8 feet 6 inches wide, with adjustable steam jets and capable of dealing with various sizes and shapes of can. The jets are



The 6,000 cu. ft. meter.



A view of the gas-fired boiler.

positioned to spray steam on the centre of each can as it travels through the box. Drive is by 4 h.p. motor, *via* variable reduction gearing and chain sprocket, to the main shafting of the exhauster box, the speed being regulated in accordance with the size of the can processed. The temperature in the box should not be below 190° F., while that in the centre of the can after exhausting should be a minimum of 140° F.

As the cans are delivered from the box, they are sealed immediately. To eliminate a bottle-neck, two double seaming machines are installed, one being semi-automatic with a capacity of twenty-four cans per minute, and the other a fully automatic model with a capacity of forty cans per minute.

The sealed cans are conveyed through a solution to remove any exterior staining, and then packed into wire baskets preparatory to the cooking process.

It is the intention to reduce manual labour to a minimum, and eventually the whole line from "check weight point" to the cleansing of the cans will be fully automatic.

The retorting operation is carried out at a temperature of 240° F. for one hour for A1 Tall cans and forty-five minutes for oval cans.

A1 Talls are cooled under cold water sprays, but the ovals cannot be similarly treated, as the sudden reduction of pressure would most probably cause can distortion. It has been decided that when the fully automatic oval line is installed, pressure cooling in the retorts will be adopted.

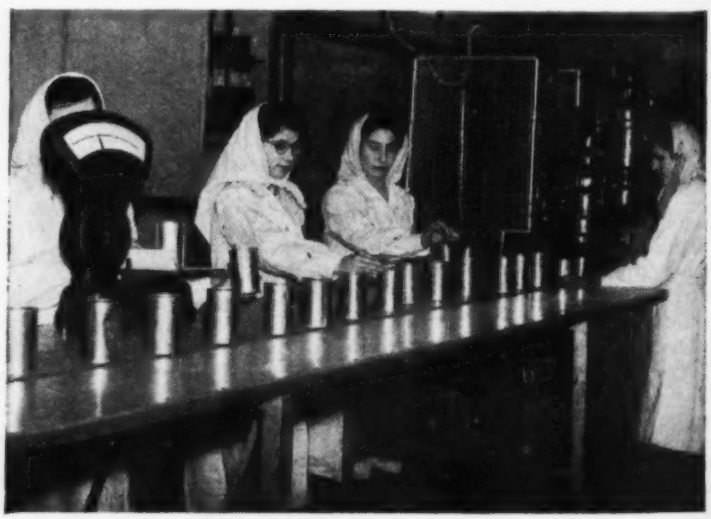
After cooling the cans are delivered to the packing room where they are labelled and packed into cartons for delivery to agents. A conveyor is being installed to deliver the cans from the cooling section to the labelling and packing department.

Steam Consumption

Directly steam was "on" a test was carried out on the exhauster, when it was found that a temperature of 200° F. was reached within fifteen minutes, with a steam consumption of 250 lb. The actual steam consumption during exhausting was reduced to 10 per cent. of the total.

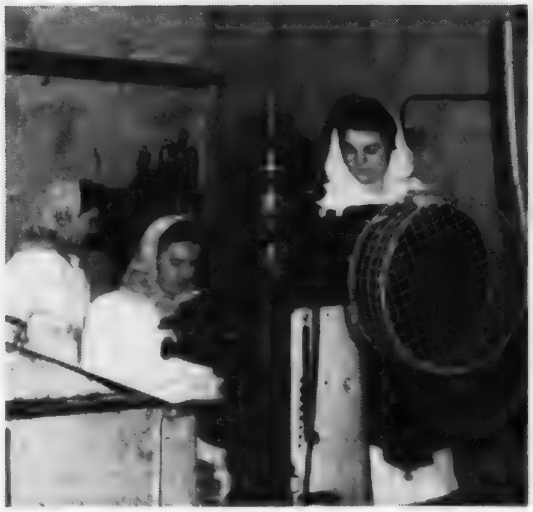
The retorts were similarly tested, and it was found that with a steam consumption of 300 lb. per hour per retort, the heating-up period was fifty minutes. The complete cycle, allowing twenty minutes for loading and unloading and one hour's cooking period, was two hours ten minutes. This time has been reduced to one hour forty minutes by increasing the steam input to each retort.

A Holmes 6,000 cubic feet B.M. meter is fed by a 4 in. service, with a Jeavons governor on the inlet, the whole being adequately valved. A 4 in.



Weight checking and clinching in progress.

Operators load filled cans of fish on to the exhauster.



Cans come off the exhauster belt to the double seamer.

supply is carried direct to a quick-acting rack and pinion control valve at the boiler.

The boiler is tank fed, with electrically operated pumps for automatic and hand control and emergency steam injector pump for use in the event of electrical failure. A low-level alarm is incorporated with the float type switch gear.

Included in the boiler fittings is the patent controlled flame regulator, which ensures safety in lighting, with control of gas throughout by steam pressure and boiler water level. Also incorporated is a purging valve, which is closed after ignition, to enable the regulator adequately to control the main gas supply.

The usual flue gas tests were carried out with satisfactory results.

Consumptions and output have been checked over a period, and it is interesting to observe that with the present gas charges, an economical level has been reached with this installation. Details of consumption and output, using A1 Tall cans, are given in the Table.

The tested maximum consumption of the boiler was 4,000 cubic feet per hour, with by-pass consumption 30 cubic feet.

Consequent on the delay in delivery of necessary materials, the installation is not complete, and lower consumption figures are anticipated when the boiler and retorts, together with all steam supplies, are efficiently lagged. Increased daily outputs to the anticipated level of 8,000 cans will further reduce these figures.

	Output (Cans).	*Consumption (Cu. Ft.).*	*Consumption Per Can (Cu. Ft.).*
To 14.12.48	30,000	177,900	5·96
15.12.48	4,000	15,800	3·95
16.12.48	6,600	21,400	3·24
17.12.48	6,000	23,600	3·93
2. 2.49	2,600	9,370	3·60

SUPPLIERS OF EQUIPMENT

Washing machine: *Fisadco, Ltd.*

Loose cover clincher and double seamers: *The Metal Box Co., Ltd.*

Exhauster: *Bon Accord Press Tool Co., Ltd.*

Retorts: *Fraser and Fraser, Ltd.*

Gas-fired steam boiler and boiler feed pumps: *Controlled Flame Boilers, Ltd.*

Reduction gearing to exhauster: *Stone and Co., Ltd.*

General view of the retorts and gas-fired boiler.

Wining and Dining

A LIGHTHEARTED little book* on wine has been written for the "average business man who hardly knows the difference between white wines and red, or grape and grain—yet is the man who buys most of the wines in this country." The author offers it as "a book on how to know, select, order, and serve wines, and he who reads will earn the appreciation of those whom he entertains and the respect of those who serve him."

And a very good aim, too! But wine drinking is like billiards playing, with a difference. Good billiards playing is traditionally a sign of a misspent youth; a connoisseur of wines may be called the result of a well-spent one.

Wine and the Average Man

The "average business man" must smell the wine first, then taste it. It must be at the right temperature and of the right colour and limpidity. We can only hope that he will deceive his guests (he will, if they are in the category described by the author). But what of the wine waiter? Anyway, the A.B.M. may comfort himself with the thought that not by a flicker of his eyelid will that solemn functionary betray himself, whatever his inward communings may be.

The book deals superficially with the subjects it covers, but it should not be unduly depreciated on that account. It may urge the neophyte to further study, and suggest to him the delights to come, even during the period of initiation.

The chapter on cocktails, immediately following that about wine, will come as a shock to the genuine wine drinker. "As a prelude to a meal," says one eminent writer, "their alcoholic content is far too high and their savour much too gross and obvious so that they kill any fine wine that may follow them." And as for tobacco—this is also anathema. But it is unlikely that the A.B.M. will take his new "hobby" as seriously as all that.

The chapter on planning a dinner party gives some sound tips and there are some useful translations of French menus into plain English. This book is recommended to the uninitiated. After its study, may he be able to meet the questioning eye of the wine waiter without a quiver!

A Kingly Banquet

Many foods and wines are an acquired taste; flavourings and herbs which came to us from the days when the rottenness and smell of the fare had to be disguised are not necessary now, but the heights to which the pursuit of the palate can take its disciples are shown in the re-creation of a banquet of 1363 attempted by Mr. Layton in his book.* This medieval banquet was attended by King Edward III and four other kings. The author, after reconstructing the original story, takes us through his own war-time and post-war experiences in catering and his search for the kingly counterparts for his modern recreation. These as he finds them are given short biographies, and the author concludes his reminiscences with a description of the feast as it was held in 1946 on the site of the original fourteenth-century banquet.

The whole is woven together by the author's energetic personality and his almost passionate interest in food and drink.

* . . . *And to Drink, Sir?* By Martin H. Perry. Pp. 72. St. Giles Publishing Co., London. Price 7s. 6d. net.

Fourteen Books in One

FOOD manufacturers, food chemists, and students of food technology will welcome the appearance of the sixteenth edition of a manual† dealing with every phase of the food industry which, during the past years, has established itself as an authoritative work on the manufacture of food products and ancillary subjects.

Encyclopaedical in its arrangement, it is divided into sections written by experts well known in their particular fields. The sections include:

Cereals: Milling, Flour, Baking, Flour Confectionery.
Sugar Confectionery: Candy, Chocolate, Jams, Jellies.
Canning and Preserving.
Meat Products.
Pickles and Sauces.
The Dairy Industry.
Food Dehydration.
Food Storage and Refrigeration: Insulation, Air-conditioning.
Food Handling: Plant and Equipment.
Edible Fats and Fatty Foods.
Fruit Juice Products.
Packaging: Materials, Containers, Machinery.
The Boiler House.
Composition of Foods.

As in previous issues, all sections have been carefully scrutinised by their respective authors and revised, where necessary, in the light of recent developments.

Easy reference is assured by the alphabetical arrangement of the items in each section, and this is augmented by a comprehensive subject index containing more than 2,000 items.

Lists of manufacturers of products, plant, and equipment arranged in alphabetical order round off a book which few food manufacturers, food chemists, food factory engineers, or anyone connected with the industry can afford to be without.

* *Five to a Feast.* By T. A. Layton. Pp. 219. Duckworth, London. Price 12s. 6d. net.

† *Food Industries Manual.* Sixteenth edition. Edited by T. Crosbie-Walsh, F.R.I.C. Pp. 1126. Leonard Hill, London. Price 42s. net.

Detection and Measurement of Foodstuff Spoilage

R. W. MONCRIEFF, B.Sc., F.T.I., F.R.I.C.

Part I

Incipient decomposition of foodstuffs, particularly of protein nature, leads to the formation of substances which normally, although not invariably, exhibit unpleasant tastes and odours. In a few cases, such as those of game and cheese, the foods are preferred after the start of decomposition; but these are exceptional cases, and as a general rule the odours and flavours that are the outcome of the first stages of decomposition are held to be repugnant. There is some difference between individuals, and perhaps more between races, in the amount of decomposition which can be tolerated, or even esteemed, but with minor exceptions there is a universal demand for protein food to be fresh, and a uniform condemnation and rejection of material that has a characteristic off-flavour.

TASTE and smell are the natural arbiters of the suitability of a material for food. Smell gives the first assessment, and if this is unfavourable, the material will, except under extreme conditions such as starvation, be rejected. If the material passes the test of smell, taste is the final arbiter, and according to the reaction of the taste organs the material will be swallowed or rejected.

The two senses, taste and smell, particularly the latter, are extraordinarily sensitive. The delicacy of the sense of smell for detecting the presence of odorous materials has been likened to that of the spectroscope, rather than that of methods of chemical identification. If a substance has a reasonably noticeable smell, quantities of it that would be quite unweighable on a micro-balance are readily detected by the nose. Taste, too, particularly in the case of bitter substances, is often more delicate than any analytical chemistry methods.

An instance of this sensitiveness of the sense of taste has been given by the Dairy Research Institute of Pretoria,[1] where the possibility of using numerous chemical tests to detect rancidity in butter was investigated, the results showing that the sense of taste was more sensitive than any chemical test—a striking tribute to the delicacy of the sense organ, and an indication of the difficulty likely to be experienced in finding a satisfactory alternative for organoleptic testing.

Disadvantages of Organoleptic Testing

In spite of its sensitivity, complete reliance on organoleptic testing is not altogether satisfactory from the point of view of the foodstuff manufacturer. In the first place, the use of a flavour panel, or even of individual tasters, is time-consuming and expensive. A flavour panel takes up a large proportion of the time of perhaps eight or ten individuals, and its proper function is that of assessing prototype flavour, not of judging large numbers of samples taken from production. Secondly, organoleptic tests cannot be made rapidly; time has to be allowed after each "taste" for the mouth to recover its neutral state so that the residual taste from the previous sample does not interfere with the taste of the sample actually being tested. Thirdly, analysis of the results obtained from a flavour panel is not always simple; different members of the panel will exhibit individual preferences, and the results may require mathematical treatment in order to assess fairly the significance of their findings. Finally, and perhaps most important of all, what the food processor really requires is a method of test which will indicate that a change in the material he is working has started, before it reaches the stage where it is detectable by taste.

Reliable Tests Wanted

If satisfactory and reliable tests could be devised to indicate when some change which would eventually lead to the development of an off-flavour in food had started, before the off-flavour had become noticeable, they would clearly be of very great help to food processors. An appreciation of the potential value of such tests has led to the exploration of many possible ways of testing foodstuffs by chemical and physical methods.

Only occasionally has success rewarded these investigations, and it is still impossible to devise tests which will match, far less surpass, organoleptic testing, in anything approaching general application. In some cases, however, it has been found possible to devise tests which have given satisfactory and useful results with a limited range of

foodstuffs. Apart from their present value in their own fields, they are of interest as indicating the lines along which further investigation may yield promising results, possibly of wider application.

The pioneer nearly always travels slowly, but once he has shown the way, others can quickly follow. Hitherto progress in the development of chemical and physical tests for detecting spoilage in foodstuffs may have been slow, but now that a few useful methods, even of limited application, have been devised, it may be expected that others of more general utility will quickly follow. Although, in general, the measurement of flavour is still beyond our resources, there are individual cases where a property that runs parallel with flavour can be measured by physical or chemical means.

Before discussing them, it is desirable to indicate a type of off-flavour that they can hardly hope to detect.

Adventitious Off-flavours

The type of flavour change that physical and chemical methods detect is that which is due to decomposition, usually caused by oxidative changes or by bacterial activity. There are, however, some flavours that occur occasionally, which although they are undesirable and render food unattractive, are due not to decomposition but to some extraneous cause. For instance honey from an apiary near Kensington Gardens was reported by Melville[2] to have an unusual flavour; on being tasted the first impression was of a mild floral bouquet, and this was followed by a persistent after-taste of cats, recalling the cat-like odour given off by elder flowers. The off-flavour was eventually traced to the pollen which the bees had collected from the "Tree of Heaven," which is grown as a street-tree in Kensington, and which has male flowers with a strong unpleasant odour recalling that of elder flowers.

Another example is the relatively rare fishy flavour which occurs in new-laid eggs if the fowls have had too much fish-meal included in their feed, and still another is the fishy oily taste in butter which has been attributed to the presence of betaines,[3] these being derived from the beet-tops fed to the cattle.

In all these cases the product is quite wholesome, and the off-flavour is attributable to the food on which the animal has fed. Always in the case of foods of animal origin, the flavour will be influenced by the diet of the animal. Chemical and physical tests to detect such adventitious flavours have not yet been devised. Those that are available are concerned with the detection of decomposition.

Shearing Strength

Pyke[4] has pointed out, as an example of the vagaries that are to be found in taste preferences, that to people in this country putrid pheasant is good, but putrid chicken is bad.

An interesting attempt to correlate the degree of decomposition of poultry meat with its shearing strength has been reported by Lowe and Steward.[5] Poultry meat that had been held in cold storage was evaluated (1) before being cooked, (2) during cooking, and (3) after being cooked. The strength of the *pectoralis major* muscle of the fowl was determined on a shearing apparatus—the lower its strength the more advanced was the decomposition. Good agreement was obtained between the measurements made and the judgment of a taste panel. It was noted that the flavour of the thigh muscles deteriorated before that of the breast. Whether the method is of practical use, other than in very special cases, may perhaps be doubted, but it affords a good illustration of the way in which physical methods are already being applied to the measurement of flavour.

The connexion between flavour and shear strength is not so remote as it might at first sight appear to be. The protein matter consists of polypeptides, and in the case of muscle these will consist largely of long linear molecules; the strength of the muscle will depend largely on the mean length of the polypeptide molecules. Once decomposition starts, the amide linkages in the polypeptide chains will be hydrolysed, and the long molecules broken down into shorter ones, with a corresponding reduction of strength.

Results of Decomposition

Decomposition invariably results in the degradation of large molecules into smaller ones; usually the substances constituted of large molecules have only a low volatility and slight solubility in water, so that they give rise to only mild odours and tastes, flavours that normally are associated with fresh meat. When, however, decomposition has commenced, a high concentration of smaller molecules arises; usually these are the molecules of amino acids and of amines, aldehydes, and alcohols. These relatively low molecular weight substances are much more volatile and more readily soluble in water or in the saliva, so that they give rise to powerful odours and flavours.

As loss of strength and the appearance of undesirable odours are both due to hydrolysis of the polypeptides, it is not unreasonable to look for a relation between the two. The fact that strength depends so very greatly on molecular length renders it likely that the reduction in strength which occurs as soon as hydrolysis starts will be observable before any flavour changes can take place. If, for example, the long molecules are halved in mean length a significant reduction in strength will occur, although the individual molecules may still be sufficiently long to make it unlikely that the volatility and solubility of the material they compose will be seriously affected; in other words change in strength will be noticeable before any change in flavour can be organoleptically assessed.

In this respect the principle of the method is extremely attractive, as it should open the way to the physical detection of decomposition before any flavour changes have become noticeable. Clearly such a method would be invaluable compared with one which correlated a physical or chemical property with a change of flavour that has already taken place.

Viscosity and its Bearing on Decomposition

Bearing in mind the principle involved, *viz.* that decomposition is accompanied by a reduction in the mean size of molecules, it should be quite possible to detect incipient decomposition by other physical methods.

If, for example, a suitable solvent can be found for the material under examination, then determination of the viscosity of solutions of the material would give an unmistakable indication of the onset of decomposition and reduction in the molecular weight. It is probable that it would be unnecessary to find a solvent that would completely dissolve the foodstuff under examination, and that an extract of the meat made with *m*-cresol under standard conditions would, by variation in the viscosity of the resulting solution, reveal degradative chemical changes that had commenced, even though these were insufficiently far advanced to have affected the flavour.

Other standard methods of determining the molecular weight of polymeric materials could doubtless be applied.

Fluorescence Measurements

Fluorescence is often exhibited by chemically unsaturated compounds, particularly those that have a resonating structure. Grant and Lips[6] have correlated the appearance of rancid odours in lard with the disappearance of fluorescent materials. These are thought to be natural antioxidants; so long as they survive, the lard will not be oxidised, but once they have been changed, probably by having themselves been oxidised, there is nothing to prevent the lard undergoing oxidative changes which result in the appearance of rancidity. A fluorescence measurement can be carried out very rapidly indeed compared with the normal organoleptic testing methods, and it has the great advantage that measurements can be made objectively and that the personal factor does not obtrude as it does in flavour panel assessment.

As early as 1931 Dingemans[7] had used fluorescence as a measure of the age of shell eggs, and he found that the method was reliable provided that the eggs had all been stored under similar conditions. Pearce and Thistle[8] appreciated the significance of this, and realised that the fluorescence measurement was related to the deterioration that had taken place in the eggs, and that it was, in fact, measuring the quality, and not the age, of the eggs which was important. They applied the method to the determination of the flavour of dried egg, and showed (as reviewed in FOOD MANUFACTURE, **21**, 2, 55) that the fluorescence readings were closely related to the quality ratings assigned by a flavour panel. With the exception of the comparatively rare fishy flavour, the fluorescence measurement gave a good indication of the deterioration which the dried egg had undergone, and it was possible with the photo-fluorimeter to assign limits of fluorescence that corresponded consistently with the flavour ratings of "good quality," "gritty," "badly scorched," "mottled," "mouldy," etc.

References will appear in the concluding part of this article to be published in the October issue of FOOD MANUFACTURE.

Cherry Varieties

AN outline of the history of the cherry variety collection was given by Mr. N. H. Grubb to Associate Members of the East Malling Research Station on July 6. The present collection of over 200 varieties was begun in 1921 by a gift from the late Mr. E. A. Bunyard.

In speaking of cherry varieties a difficulty existed in that several varieties were often called by one name, and in the Malling collection such different varieties were designated by letter. For instance, Knight's Early Black A was the same variety as Circassian B, whereas Knight's Early Black B was a distinct variety grown under that name for seventy years in the Sittingbourne district.

The importance of suitability of soil and its effect on bacterial canker, season of ripening, provision of cross pollination, and an arrangement that permitted the picking of rows in succession was emphasised by Mr. Grubb.

Mr. R. J. Garner briefly referred to his search for a rootstock to produce smaller cherry trees. The majority of Mazzard stocks appeared to produce very large trees, and he had turned his attention to species of cherry instead. Unfortunately most varieties failed to grow on these, but Frogmore appeared to tolerate some of these rootstocks. As an instance, Mr. Garner showed some Frogmore on acid and on Mazzard stocks. The trees on acid stock were much smaller, but in their sixth year some had produced 17 lb. of fruit, whereas on the Mazzard the crop was about 11 lb. Already, however, two of the trees on acid stock had died and had had to be replaced. The search for more dwarfing Mazzard stocks was being continued, and already interesting ones were under observation.

A spraying trial against bacterial canker was described by Dr. M. H. Moore in which home-made Bordeaux mixture was proving appreciably superior to various substitute sprays containing copper in other forms. Reference was also made to modification in the spray programme and other control measures now under investigation.

S.C.I. at Manchester

Held at Manchester from July 11 to 15, the 68th Annual Meeting of the Society of Chemical Industry was yet another memorable and successful event.

THE proceedings started on July 11 with a reception by Mr. James H. Clayton, chairman of the Manchester section, and Mr. and Mrs. J. McKillop.

On July 12, at the annual general meeting, a welcome was given to the Society by the Right Worshipful the Lord Mayor of Manchester and by the Vice-Chancellor of Manchester University. At the conclusion of the business, an address by the retiring President, Sir David Rivett, under the title "Chemists and the Commonwealth," was a masterly diagnosis of a problem which today confronts scientists in many countries, the problem of science, secrecy, and security. As chairman of the Commonwealth Council for Scientific and Industrial Research, a body which recently has been placed to a large extent under direct governmental control, Sir David spoke from first-hand experience of the problem. This move, he said, had robbed the C.S.I.R. of the outstanding gift bestowed upon it by successive governments, the freedom to pursue its investigations in accordance with its own estimate of the scientific needs of the country and the scientific ability available to cope with them.

Mr. Stanley Robson, M.Sc., D.I.C., F.R.I.C., President of the S.C.I., 1949-50.

The motive for making it legally possible to place any or all of the C.S.I.R.'s work under the direct control of a government department was prompted by a political campaign which alleged that there were on its staff people who could not be relied upon to respect such rules as were in force covering "classified information." It sprang from a widespread feeling that all scientific work, even if it appeared only remotely associated with war technology, should be closely guarded, controlled, and, in greater or less measure, kept out of view. Even its directions of development should be kept under supervision.

Secrecy and Progress

Sir David attacked this viewpoint as follows: "Assuming that security is a present democratic demand and aim, how may it best be attained, so far at least as scientific work is concerned, in view of international relations of the present power-politics type? The impetuous reply is 'Through secrecy!' but the more thoughtful reply is surely 'Through achievement!' At once we are up against the hotly debated question as to whether secrecy and achievement are compatible; and again a categorical answer, free from all qualification, is difficult. But broadly, was not Dr. Karl Compton (former head of the M.I.T. and now Dr. Vannevar Bush's successor as chairman of the Research and Development Board of the National Military Establishment) right in his assertion: 'Secrecy and progress are mutually inimical'? Moreover, even if your secrets (inevitably ageing secrets) do get out, in how many cases does the receiver of these secrets gain greatly in such dynamic, such rapidly moving sciences as our own and physics?"

The attack on the freedom of science was not, in Sir David's view, a local Australian problem but one which was being carried out in many other countries—New Zealand, South Africa, and even "in the calm United Kingdom." Although he did not see any way out of the maze he thought that the situation would best be handled by men capable of seeing every side of the problem as it exists today. For that reason he pleaded for more co-operation and integration by scientists in every country, saying in conclusion, "I think that from the scientific side we owe it to the political folk to do our very best to help them solve a puzzle for the propounding of which we must accept some responsibility. Unless we can prove to them that their responsibilities can be discharged by methods which will not, in our view and on the basis of our experience, handicap the progress of science and its application, we shall have only ourselves to blame."

Election of New President

After his Presidential Address, Sir David formally inducted the new president, Mr. Stanley Robson, who, as chairman of the Council, has carried out many of the duties which Sir David, through his absence in Australia, was unable to perform during his year of office.

Tuesday's proceedings ended with a reception by the Lord Mayor of Manchester in the Town Hall.

Medallist's Address

The main event of Wednesday morning, part of which was taken up with scientific sessions, was

the presentation of the Society's Medal to Dr. Foster Dee Snell, one-time chairman of the American Section of the S.C.I. and a well-known New York consulting chemist. Detergents and detergency were the subjects of his address.

On Wednesday members attended a lunch at the invitation of Hardman and Holden, Ltd. Mr. K. G. Holden's welcome to the guests was responded to by Sir David Rivett. In his speech, Sir David put forward the idea that a party of S.C.I. members should visit Australia to examine common problems of science and technology. This was an elaboration of part of his Presidential Address in which he advocated closer co-operation on technical problems.

Lord Bruce at Annual Dinner

This problem of economic equilibrium between Great Britain and Commonwealth countries was further examined by Lord Bruce of Melbourne, speaking at the annual dinner of the Society held on Wednesday evening. There was, he believed, no hope for the world unless its undeveloped areas were made productive. New wealth must be brought in to meet present difficulties. This was not as easy a task as it had been in the nineteenth century.

The countries possessing undeveloped areas were now creating secondary as well as primary industries. What, therefore, would happen to the secondary industries of the old world which existed on the raw materials provided by the new? Their hope for survival lay in being better and quicker at applying the work of their scientists and technicians. The bread and butter industries should be allowed to pass to the younger countries and new industries based on first-class scientific research developed in their place. It was for this reason that Lord Bruce considered the S.C.I. a vital factor in the world today because it not only sought to encourage pure science but also to apply it.

Sir David Rivett followed Lord Bruce and pointed out that it was largely due to the latter when he was Prime Minister of Australia that the C.S.I.R. had been brought into being.

Other speakers at the dinner were Dr. L. H. Lampitt, hon. foreign secretary of the Society, who proposed the toast of the City and University of Manchester, the Lord Mayor of Manchester, and Prof. T. W. Manson, Pro Vice-Chancellor of the University, who replied; Mr. James H. Clayton, chairman of the Manchester Section, who proposed the Guests, and Prof. Paul Karrer, Nobel Laureate for Chemistry, who replied.

The concluding ceremony was performed by Dr. Lampitt, who presented Sir David Rivett with a gold badge which is given to all retiring Presidents.

Thursday morning was taken up with lectures and an address, the latter being the Ivan Levinstein Memorial Lecture given by Prof. Paul Karrer.

Sir David Rivett (*right*) **in conversation with Mr. K. G. Holden at the luncheon given by Hardman and Holden, Ltd.**

Dealing with the biological importance of the vitamins and related substances, Prof. Karrer said that vitamin research was one of the most impressive examples of collaboration between science and technics, for today vitamins were the mass products of the pharmaceutical industry, their world sales value exceeding $100,000,000.

Knowledge of the functions of the different vitamins in the animal organism was still rather fragmentary, in which connexion he mentioned vitamin A. Prof. Karrer also described some of the effects of anti-vitamins. One was recently discovered when animals on a silver-fox farm were seized with spasms and died. Their food of raw fish was responsible, and vitamin B_1 was found to be a preventive. Thus the fish contained a substance capable of inactivating vitamin B_1, which was essential to the foxes' health. The best-known examples of the synthetic anti-vitamins were sulphonamides.

Prof. Karrer referred to the greatly increased expectation of life during the last decades in nearly all countries, but concluded that the greatest mystery of life, the living protoplasm, was untouched, and it was doubtful whether human ingenuity could ever solve it.

After Prof. Karrer's lecture, luncheon was given by invitation of the directors of the Clayton Aniline Co., and in the evening a reception was given by the Council of Manchester University during which Sir David Rivett received the degree of D.Sc. *honoris causa*.

The main event of Friday morning was a visit of about 100 members to the Shell chemical plant at Stanlow, a description of which is given elsewhere in this issue.

The concluding event of the meeting was a

dinner and dance given by Imperial Chemical Industries presided over by I.C.I. director Dr. C. J. T. Cronshaw, who proposed the toast of the S.C.I. and in doing so recalled that Sir David Rivett was connected with an I.C.I. forerunner, Brunner Mond, during the first world war. In reply, Sir David thanked all who had organised the meeting for its outstanding success and mentioned particularly the hospitality of the Manchester people.

Throughout the meeting a series of visits to factories and research establishments was made. Two of the most outstanding were the trips to the new petroleum chemicals plants: Petrochemicals Ltd. at Partington, and Shell at Stanlow. These are completely new additions to the British chemical scene, and although much has been published about them it was the first time that many chemists had had the opportunity to see these projects for themselves. The feature of the Petrochemicals plant which distinguishes it from the Shell project is that it employs the unique Catarole process which produces both aromatic hydrocarbons and non-aromatic compounds. The Petrochemicals plant is now nearing completion. The first cracking units were started up in January of this year and part of the gas yield is being pumped direct to Manchester's gas works to blend with the normal town gas supply.

Other factories visited were the British Schering Research Laboratories, the Chloride Electrical Storage Co., Courtaulds, Dunlop Rubber Co., Fibreglass, Thomas Hedley and Co., the I.C.I. Alkali, Salt, Leathercloth and Dyestuffs Divisions, Mather and Platt, and Manchester Oil Refinery.

It remains to rhapsodise a little on the resplendence of the social functions graced by "fair women and brave men," on the wonderful hospitality, on the brilliance of after-dinner speeches, and on the general air of *camaraderie* which permeated the functions.

Vanillin in Aqueous Solutions

SOLUTIONS of vanillin are usually prepared with alcohol as it is not sufficiently soluble in water to produce an extract strong enough to be used as a flavouring agent.

According to an American patent (No. 2,429,907) a non-alcoholic solution, containing 10 to 15 g. per litre of vanillin and up to 2 g. per litre of coumarin, can be obtained. The vanillin and coumarin are first dissolved in a solution of sodium phosphate, citrate or tartrate, after which water is added to the desired quantity.

The *p*H of the solution is adjusted to 5 to 7 by the addition either of sodium hydroxide or citric acid, as necessary.

The solution is stable and does not contain undesirable amounts of sodium vanillate.

Heat Penetration in Cans and Jars

IN 1946 a Committee was formed to outline experiments for determining comparative rates of heat penetration in jars and cans of corresponding sizes. The object was twofold. First, to determine what modification, if any, of C. Olin Ball's mathematical method of process calculation[1, 2] for cans was necessary to make it applicable to glass. Second, to determine if any factor or factors could be developed which, when applied to processes for foods packed in metal containers, would give corresponding processes for similar foods packed in glass containers.

The project was a co-operative one, sponsored jointly by the National Canners' Association, the Glass Container Manufacturers' Institute, and the University of California Laboratory for Research in the Canning Industries, G. W. Hooper Foundation for Medical Research.

Tests with Glass and Metal Containers

Comparative heat penetration tests were made on bentonite suspensions in glass and metal containers, 1 per cent. suspensions being used to determine convection heating rates and 5 per cent. for conduction heating rates.

Some results published in *Food Technology*, June 1949, are summarised as follows:

1. *Effect of a long as compared with a short come-up time.* A long come-up time had a significant effect in reducing the process time required after the retort reached holding temperature.

2. *Comparison of heating rates of jars and cans in water.* With 1 per cent. bentonite, jars heated appreciably slower than cans of corresponding sizes. This effect was not so pronounced with the 5 per cent. bentonite, particularly in the smaller sizes of containers.

3. *Comparison of heating rates of cans in water in steam.* Results showed no significant differences with either 1 per cent. or 5 per cent. bentonite.

4. *Significance of jar position.* With 1 per cent. bentonite, the cap-up position gave somewhat slower heating rates than either the cap-down or horizontal positions, which were about equal. Position appeared to have no appreciable effect on the heating rate of 5 per cent. bentonite.

5. *Application of Ball's calculation method to processes for glass.* It was found that Ball's method can be applied with certain corrections.

Inoculated experimental packs were made of five food products in glass and tin, and comparative heat penetration data obtained. Results approximated closely to those obtained in process calculations based on heat penetration results with bentonite.

REFERENCES

[1] Ball, C. O. Thermal process time for canned food. National Research Council *Bull.*, **37**, 1923.

[2] Ball, C. O. Mathematical solutions of problems on thermal processing of canned food. Univ. of California Pubs. in Public Health, **1**, 15-245, 1928.

The Grape Industry in California

Following his visit to the San Joaquin Valley, California, Frank M. Read, M.Agr.Sc., Chief Inspector of Horticulture of the Department of Agriculture, Melbourne, Australia, describes the production of grapes for drying as compared with the Australian industry.

FROM an area of about 500,000 acres, California produces four-fifths of all grapes grown in the United States of America. Drying varieties occupy 250,000 acres and produce about 1,750,000 tons fresh weight. The corresponding figures for wine varieties are 170,000 acres and 535,000 tons; and for table grapes 80,000 acres and 600,000 tons. The wine varieties are used exclusively for wine or grape juice, but both the table and raisin grapes contribute substantially to wine and brandy making from the totals quoted above.

The Thompson seedless grape at Fresno.

Drying Varieties

As in Australia, the principal drying varieties are Thompson Seedless, Muscat of Alexandria (Gordo), and Zante currant. The Thompson is very similar to the variety known in Australia as the "sultana." The American "sultana" is an inferior drying grape grown to a very limited extent only, and not so like the Australian sultana as is the Thompson Seedless.

Between 10 per cent. and 15 per cent. of the grapes in the Fresno district are planted on resistant stock No. 1613 (Rupestris × Riparia), which is resistant to both Phylloxera and Root Knot nematode. Rupesta du Lot is said to have been the best of the resistant stocks of the early plantings, but "1613" is now universally preferred.

Harvesting and Drying

The bunches, when ripe, are cut and placed in a single layer on "trays" at the foot of the vine on the sunny side—that is, south of the east-west rows. The "trays" were originally of light timber, but are now simply sheets of brown paper 3 ft. × 2 ft. When the grapes are sufficiently dry on the upper side they are skilfully turned by hand with the aid of a spare tray so that, without disturbing the bunches, the underside is then exposed to the sun.

Abstracted by permission from the Journal of Agriculture, Victoria.

The next process is to roll up the paper "trays." Usually the ends are tucked in, but sometimes they are left open so that the air can pass through.

The bundles are left at the foot of the vine for a few more days to even up the moisture of the berries, and they are then picked up and the fruit emptied into sweat boxes to be stored in a central place on the vineyard until taken to the packing house.

In handling the sweat boxes at this central point — that is, moving them from the lorry into the stack—an electric hoist is frequently used, consisting of a cross-beam spanning the proposed stack of sweats with two legs at either end. Working on the cross-beam is a small electric motor and block and tackle. The whole outfit is mounted on wheels, electricity being conveyed by a long flex from the power point.

A small part of the Thompson Seedless crop, up to 20,000 tons, is not field dried, but is dehydrated to produce a light golden or "bleached" berry. This is not popular with buyers in the United States, who prefer the dark brown colour and full flavour of their sun-dried fruit, but until late years it found a market in Great Britain and Europe. Recent press statements that special arrangements have been made between the United States and British Governments for the purchase of dried vine fruit might be concerned partly with the Americans' inability at the time of the author's visit to sell this "bleached" product easily.

For dehydration, Thompsons are left longer on the vine until they are yellow green. When harvested, they are dipped in a manner similar to Australian fruit, but always in hot caustic soda up to 1¼ per cent. at temperatures varying from 190° F. to 205° F. Fruit from the dip is spread on to wooden trays 6 ft. × 3 ft., and after a short draining these go into a sulphur chamber 6 ft. × 8 ft. × 10 ft. high for three to four hours. Up to 12 lb. of sulphur is burnt in the chamber in this time, in a tray which is pushed into a 9 in. pipe running

Typical row of Thompson Seedless grapes drying on trays.

beneath the floor of the sulphur chamber and open at the rear end.

From the sulphur chamber the fruit passes to the tunnel dehydrator. A commencing temperature of 160° F. to a finishing temperature of 130° F. is recommended for a dehydration period of up to thirty-six hours, but in two tunnels seen by the author at Fresno and Modesto temperatures of 155° F. and 160° F. respectively were being aimed at throughout the length of the tunnel for the whole drying period, the inlet doors of the tunnel being left open throughout drying and air at these temperatures simply being blown through by a fan from a fuel-oil heater at the remote end.

The time taken to dry the fruit is from eighteen to twenty-four hours. A final pack of 18 per cent. moisture is permitted.

The Sun Maid Co-operative Co. packs up to 150,000 tons a year out of the total annual production of about 275,000 tons a year.

When fruit is delivered by a grower the load is inspected, and if, in the opinion of the packing house, it is not too high in moisture content and is in reasonable condition, it is accepted. No grade is given at this time.

As the box goes down the gravity conveyor from the load, a man digs and grabs a handful from the middle of each box, taking sufficient from each box to fill a bushel box for each load. This bushel box contains big stems, small stems, and berries in what is considered the same proportion as in the load. This sample box is taken to a small cleaner where it is put through a drum and a shaker grader.

There is no attempt made to measure the proportion of stems, etc., as it is assumed that all loads are roughly the same, and the main basis on which the grower is paid is on a weight per volume test on the screened fruit. A small can like a 3 to 4 gal. milk can is given a standard rocking motion while being filled in a standard time with the screened fruit.

When the can is full, it is weighed and a price per ton paid in accordance with a scale of weights. The weight depends on the sugar content of the fruit and its plumpness. The sample is then put back into the box and kept a reasonable time until there is no likelihood of dispute as to price.

The moisture content of every sample is not determined, but if the grader thinks the fruit is over 17 per cent. he puts it through a test which is preferred to the resistance-box method of testing and has been in operation much longer at the Sun Maid Co-operative Co. than the electric resistance method. In this test a small tin is filled by hand with fruit dropped in lightly, ten to twenty berries at a time, taken at random from the bushel sample box.

Tests for Moisture

When full, the tin is shaken lightly for a second and its temperature is taken by inserting an ordinary thermometer. The fruit is then poured into a standard brass cylinder which is placed under a plunger which exactly fits the cylinder. The plunger is brought just to the surface of the fruit and clamped in this position. It has a vertical shaft to which is attached a horizontal pointer and a platform on which a standard weight can be placed.

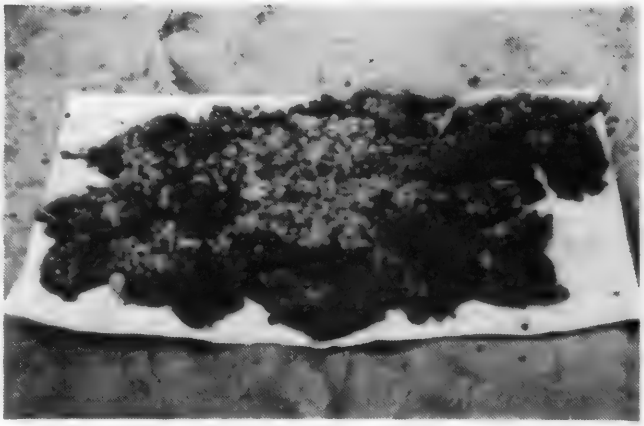
When the plunger is unclamped it tends to fall, compressing the fruit, and the amount by which it falls is shown by the pointer on a scale to the right of the machine. On this scale adjustments can be

Thompson Seedless grapes curing in bundles after drying on paper trays in which they are now wrapped.

made for the temperature of the fruit at the time the test is carried out, because the compressibility of the fruit depends on the temperature and on the moisture content. The warmer and wetter it is the easier it will compress.

The weighted plunger is allowed to compress the fruit for exactly fifteen seconds, when it is again clamped and the pointer is read. The accuracy of the test, of course, depends on the accuracy of the scale, and this was said to be the result of six months' intensive research during which the machine was tested against accurate laboratory tests for moisture and the scale adjusted accordingly until full reliability was obtained.

If the fruit shows more than 17 per cent. moisture, a deduction in price of £3 per ton is made for each 1 per cent. of moisture above 16 per cent. and a deduction of weight is also made. A charge is made for the dehydration of fruit, where necessary, irrespective of the former deductions. The system works without friction, and growers rarely question the fairness or accuracy of this method of assessing value.



The usual paper "tray" 3 feet by 2 feet on which fruit is dried at the foot of the vine.

Cleaning Includes Washing

Two outstanding things may be noticed about the cleaning of Californian dried fruit.

Firstly, there is a complete absence of dust in the cleaning house, even though, as stated earlier, the crop is simply dried on sheets of paper on the surface of the ground.

Secondly, the fruit is washed during the cleaning process before packing and is in no need of any further washing to make it thoroughly suitable for eating out of the packet or for domestic use in cooking.

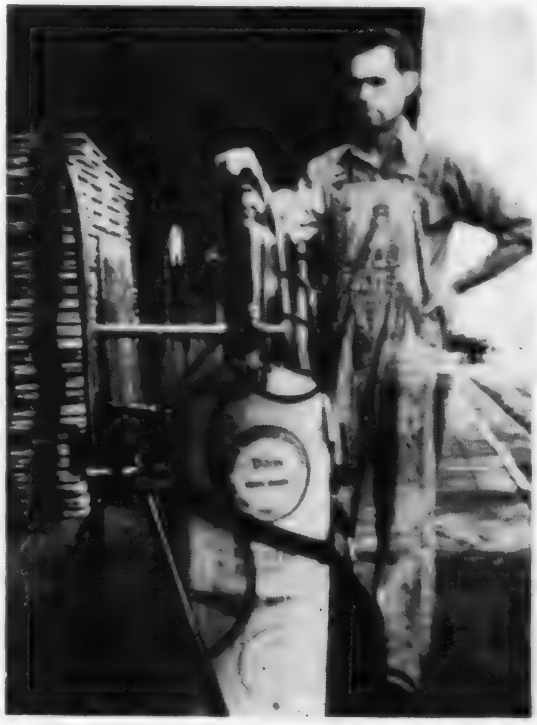
The fruit, as delivered, goes first to the big stemmer, where it travels down the inside of a sloping revolving drum about 3 ft. in diameter and on to a shaking riddle. This removes the fruit from the big stems.

The next unit is the cap stemmer to remove small stems and fruit stalks. This is a fast revolving smaller drum about 18 in. in diameter.

The fruit is put in an enclosed chute elevated to the floor above, where it is dropped through the blast from a large fan from 6 ft. to 8 ft. in diameter. This winnows out the dust, small stalks, and very small or light berries. The debris is blown along a chute outside the building to a dust arrester.

The winnowed berries are taken on a belt (belts are concave, being run on a set of three rollers of which the outer two slope up) to the fruit washer, which is a conveyor about 10 ft. in length and about a 30° downward slope with cups to hold the fruit as it is delivered from a hopper at the top. While the fruit is travelling down this fast-moving conveyor water is pouring over and through it. The water falls through the washer to be caught below and pumped up to be used again, except a percentage which is discarded from the bottom to remove the dirt.

A percentage of new water is taken in all the time, but the water used is not clear, though



Portable apparatus for fumigating dried fruit in special rooms after packing.

quite clean enough for the job. The duration of this washing process would be about three to four seconds.

The washed berries are conveyed to and passed through a double drum running at a high speed which throws out moisture by centrifugal force, but moisture is still perceptible on the surface of the fruit, which is then ready for sorting and packing. It was surprising to find that the fruit is not further dried and that fruit which is dry enough when received to be properly cap stemmed will not take up too much water in washing to cause any problem in packing.

Packing and Grading

Australian sultanas and raisins which are dipped may not behave in exactly the same way as Californian fruit, which is sun-dried without dipping, but even the dehydrated or bleached fruit which has passed through a hot caustic soda dip is cleaned in exactly the same fashion as the undipped sun-dried Thompsons. In the author's opinion similar washing tests should be carried out in Victoria to see whether drying of fruit before packing would be necessary. Even if some drying proves to be necessary, a move towards general washing of Australian fruit was considered to be in the industry's interest. The author was informed that Mediterranean producers are looking for fruit-washing machinery in the United States.

The fruit is then run on belts past girls who give it a hand sorting. Not much fruit comes out in this process, the fruit running fairly fast past them and in quite a thick layer. It is then conveyed on the belt to an adjoining building for packing into boxes or cartons, being packed either natural or oiled.

The bulk of the Thompson Seedless is sold in its natural state, but carton Thompson fruit, which is always of the highest grade, all of the seeded raisins, and some other fruit, if ordered, are oiled. The only oil permitted to be used by the Pure Foods Regulations is that obtained from grape seeds coming from the deseeding machines. Previously, mineral oils were used, but they have been declared adulterants and their use prohibited.

During its run from the cleaning building to the packing building, each belt passes under a huge electro magnet placed about 2 in. above the fruit.

Grading is on size and not on colour. All the sun-dried fruit is dark brown except the yellow berries which the bees have robbed. There is only one size grading which occurs in the original cleaning operations.

In the Packing Rooms

In the packing rooms of the Sun Maid Co. at Fresno fruit was being packed into 30 lb. boxes and cartons containing 2 lb., 15 oz., and 2 oz.; 2 lb. Cellophane packets were also being put up.

Practically the whole of the packing operations are mechanised. For instance, in the case of the 2 lb. packets the cartons are automatically fed into the machine, the fruit is automatically weighed, the carton is automatically filled with fruit, and the tops and bottoms are then automatically folded and glued. A similar operation occurs in the cases of the 30 lb. box and the 2 oz. carton. The Cellophane packets, however, are all weighed and filled by hand. They are pressed by machine, but the top is folded over and glued by hand.

Fumigation of Boxes

Ethyl formate 6 ml. in a 30 lb. box is used, and in addition to this the boxes are fumigated with methyl bromide immediately after packing or, at all events, before storage or despatch. The fumigation rooms hold 1,800 30 lb. boxes; 3½ lb. of methyl bromide in summer (4½ lb. in winter) is used in the room, the fumigation period being twelve hours. It is also customary to fumigate the loaded rail cars with methyl bromide. A special outfit for injecting the fumigant into the chamber is used.

To control the movement of boxes down sloping conveyors "non-slip" conveyor belts of treaded rubber are fitted over the metal rollers. Another item of interest was the speed belt which moves boxes, when packed, to the fumigation rooms in a steady stream at the rate of 10 feet per second.

Every case, carton, and package is stamped with a distinguishing number for each day's pack so that complaints can be traced back.

Fruit and Vegetable Canning

WRITTEN from the essentially practical angle, a recently published book* is based on canning and preserving methods used in this country and abroad, and is intended as a guide for the man who controls the production and general engineering in the meat, vegetable, and jam canning factory.

The subject ranges from the start of a cannery, through can sealing and the canning of fruit, to jam and vegetable canning, and, in treating his subjects, the author has a knack of picking out the important details without cluttering up his text with non-essentials.

A chapter typical of the writer's methods is that on retort operation which, although occupying only eleven pages, tells practically all that it is necessary to know about the practical handling of retorts.

This is a book which can be recommended for those occupied in the factory and those who wish to qualify themselves for the job.

* *Practical Canning*. By Arthur Lock. Pp. 246+xiii. Food Trade Press, London. Price 40s net.

Protein in Nutrition

Roughly dividing the development through the years of the science of nutrition into five periods, James S. McLester, M.D., at the ninety-seventh Annual Session of the American Medical Association, showed how a greater appreciation of protein has resulted.

FIRST there was the energy era, the day of the great pioneer students of metabolism, of Liebig and Voit, and then of Rubner and Atwater, Friedrich Müller, and Graham Lusk. Almost all of what we regard today as fundamental in metabolism was brought to light by these men. The standard caloric values of carbohydrate, protein, and fat, as determined at that time by Rubner and subsequently modified by Atwater, are used today in all nutritional reckonings. During this era, prime consideration was given to energy exchange, and attention to calories came first.

A little later came an era that may appropriately be called the period of adequacy in diet. Elvehjem recently remarked on the contrast between the liberal space given the regulation of the diet in the "corpus" of Hippocrates and the neglect of this subject in favour of drug therapy in the succeeding centuries. This neglect has continued almost to our time.

The third era brought protein into disrepute and it is just now recovering its good name. This was the era of economy in nutrition. It was the day of "intestinal autointoxication" when many physicians were prone to ascribe almost every ill to which human flesh is heir to protein decomposition products absorbed from the intestinal tract. This idea led the physiologist Chittenden[1] to study on himself the influence of a low protein diet. Subsisting on a diet that provided only about 40 g. of protein daily, less than half of the then accepted standard, Chittenden maintained better health than he had enjoyed before, and was greatly encouraged.

Although these beliefs in the beneficial effects of parsimony in nutrition were not accepted by scientists generally, many adherents were found in the medical profession and in the general public.

Faults in Human Experiments

Apparently, there were two faults in these human experiments which tended to make the conclusions fallacious. First, no control groups were used, and second, the time element was entirely too short. Lusk saw the difficulty clearly when he wrote that, while these experiments proved that the allowance of protein may safely be reduced during many months to half or less of what habit or appetite suggests without impairment of health or strength, it remains to be seen whether this quantity of protein in the ration, which is not greater than the body would metabolise in starvation, is advisable as a programme for the whole of one's adult life.

Stefánsson, in his life in the Arctic, became enthusiastic over the virtues of an exclusive meat diet. His physician, Lieb[2], after a careful study of the explorer, wrote that, during Stefánsson's eleven and a half years in the Arctic Circle, for long periods he subsisted solely on meat and that while on this diet he experienced the highest degree of physical and mental well-being. Of like tenor is the testimony of Thomas[3], who as a member of the McMillan Arctic Expedition of 1926 made a cardiovascular and renal survey of the Eskimos of northern Labrador and Greenland. He reported that these people, living on an exclusively carnivorous diet, showed no unusual prevalence of vascular and renal disease. Similar observations were made by a number of other investigators.

The fear entertained by many physicians, that of "intestinal autointoxication," was disposed of by Alvarez[4] in his critical review. While this physician reached the Scottish verdict of "not proven," the testimony that has accumulated since his summary of evidence justifies the verdict of "not guilty." This hastened the end of the era of protein economy.

The Vitamin Era

The fourth period was the vitamin era. The widespread interest in vitamins apparently began in 1913, and by 1922 many intricacies of metabolism had been unravelled and the vitamin era came into full development. The minerals have never fired the imagination of the public, or indeed of the profession, as have the vitamins, but during this period nutritionists have continued to emphasise the need for an adequate supply of minerals, notably of calcium and iron. More recently, the part played in the human economy by certain "trace elements" is being studied and encouraging results can dimly be envisaged.

In the treatment by vitamins of a number of disorders, such as beriberi, pellagra, etc., results have been graphic. The public caught the enthusiasm and now everyone knows about vitamins and wants them. As this enthusiasm levels out, however, certain conservative tendencies may be seen.

First is the recognition by nutritionists that if a person is well nourished and his vitamin equipment adequate, then no nutritional benefit will accrue from the further taking of these substances.

A second conservative tendency is seen in the recognition that man should, as a rule, take his vitamins in the form of natural foods. Important as vitamins are—vitally so in the treatment of deficiency states—physicians are now coming to the realisation that, for the simple maintenance of robust health, one should secure these substances, not from the pharmacist, but from the grocer and the dairyman. Helpful guidance to this end is being provided by many investigators in their extensive contributions to the knowledge of food composition, notably by Elvehjem and his co-workers.

Value of Protein

The picture changes, and today we are in the protein era. This greater appreciation of the value of protein received its first impetus about ten years ago when Rose[5] told of feeding experiments on rats that revealed the indispensability of ten of the known twenty-two amino acids. He demonstrated that it is possible to maintain life in the rat when a suitable mixture of amino acids is the only source of nitrogen. The indispensability of certain of these bodies to man, as well as to the rat, were shown by Albanese and his associates[6], who observed that when lysine and tryptophane were withdrawn from the human diet, a negative nitrogen balance resulted, which condition could be corrected only by restoration of the missing substances.

The availability of amino acid mixtures as a food has widened the nutritionist's horizon and has stimulated manifold animal experiments and clinical trials. There is still a question, however, as to whether a mixture of pure amino acids can completely and for all purposes replace the protein of the diet, for evidence has been presented suggesting the need under certain conditions for accessory factors which are themselves derived from the protein molecule. The part played by protein in the metabolism of the cell has been greatly clarified in recent years and some of our older concepts must be radically revised. The present opinion is that the proteins of the body cell are not the fixed parts of a permanent structure, like the steel framework of a building, but are labile substances in a constant state of change. Whipple and Madden[7] have demonstrated that proteins are not held in the manner that carbohydrate and fat are stored, but exist rather in a highly mobile state in which their fractions are in a constant exchange. The latter work has shown that the body maintains in the plasma and in the cells a large pool of circulating proteins which are in dynamic equilibrium, and that the contributions to this pool may concern any body cell needing protein or capable of storing surplus protein.

Resistance to Infection

Apart from the host of recent clinical observations regarding the pressing need in respect to protein of the pregnant woman and nursing mother, and the welfare and proper development of the offspring, the reports which tell of the part played by protein in resistance to infection are also significant. Cannon[8] assumed with good reason that antibody production is dependent on protein intake. Accumulating evidence indicates that protein plays a fundamental role in the maintenance of both natural and acquired resistance.

Finalising his paper, Dr. McLester said that the protein quota of the American soldier's ration in the second World War was liberal—more liberal than that of any other soldier in the world. Not the 70 g. of today's recommended daily allowance, or the 100 g. of Luck, or the 120 g. of Atwater, but 140 g., and he ate it all. Dr. McLester believes that this liberality of protein allowance in the American soldier's ration, measured in terms of greater vigour, quicker recovery from injury, and a higher degree of morale, contributed to the winning of the war.

REFERENCES

1. Chittenden, R. H., "Physiological Economy in Nutrition, with Special Reference to the Mineral Requirement of the Healthy Man: An Experimental Study" (New York), 1904; "The Nutrition of Man" (New York), 1907.
2. Lieb, C. W., "Effects of an Exclusive, Long-Continued Meat Diet Based on the History, Experiences, and Clinical Survey of Vilhjalmur Stefánsson, Arctic Explorer," *J.A.M.A.*, **87**, 25, July, 1926.
3. Thomas, W. A., "Health of a Carnivorous Race: A Study of the Eskimo," *J.A.M.A.*, **88**, 1559, May, 1927.
4. Alvarez, W. C., "Intestinal Autointoxication," *Physiol. Rev.*, **4**, 352, 1924.
5. Rose, W. C., "The Nutritive Significance of the Amino Acids and Certain Related Compounds," *Science*, **86**, 298, 1937; "The Nutritive Significance of the Amino Acids," *Physiol. Rev.*, **18**, 109, 1938.
6. Albanese, A. A., Holt, L. E., Jr., Brumback, J. E., Jr., Hayes, M., Kajdi, C., and Wangerin, D. M., "Nitrogen Balance in Experimental Lysine Deficiency in Man," *Proc. Soc. Exper. Biol. and Med.*, **48**, 728, 1941; Brumback, J. E., Jr., Kajdi, C., and Wangerin, D. M., "Nitrogen Balance in Experimental Tryptophane Deficiency in Man," *ibid.*, **48**, 726, 1941; Holt, L. E., Jr., Albanese, A. A., Shettles, L. B., Kajdi, C., and Wangerin, D. M., "Studies of Experimental Amino Acid Deficiency in Man: I. Nitrogen Balance," *Federation Proc.*, **1** (Pt. 2), 116, 1942.
7. Whipple, G. H., and Madden, S. C., "Hemoglobin Plasma Protein and Cell Protein," *Medicine*, **23**, 215, 1944.
8. Cannon, P. R., "The Importance of Proteins in Resistance to Infection, in Protein Nutrition in Health and Disease" (Chicago), American Medical Association, 1945, p. 80.

Tomato Juice in Cans

BASIL C. DE GUERIN

One of the Jersey tomato farmer's principal worries of the season, almost as great as that of drought or disease in his crop, is the fear of a slump on the English markets at the time of his peak production. When this happens, as it did in 1947, the Ministry of Food can drop an "iron curtain" on exports from the island, and growers then have to sit and watch all their money, time, and labour rot on the plant. Such a situation was visualised by Mr. S. W. Smedley of National Canning Co., Ltd., when this company took control of the local Jersey Canners, Ltd., two years ago. Machinery was therefore installed with which it was hoped to experiment in a comparatively small way in the preparation of tomato juice, but before it had been really tried out the slump of 1947 compelled its use in order to prevent, or at least alleviate, what threatened to develop into an island crisis involving the loss of thousands of pounds to the growers.

JERSEY CANNERS, LTD., have been established for half a century, and since Mr. Smedley's active control, with Mr. J. S. Norman as manager, have increased many times their annual turnover in canned tomatoes, peas, beans, potatoes, and other island products.

There is a great difference between canning tomatoes and preparing tomato juice. It is not just a matter of crushing the tomato and extracting the juice, and it had been left entirely to the Americans to produce this article on a commercial basis. Now that Jersey has proved it can be done at home there is an opportunity to save many thousands of dollars annually.

The principal problems lay not in the mechanical processes. Considerable process research had to be carried out in the laboratory, but while this was still going on Jersey Canners imported and installed that part of the machinery which it was essential to obtain from America.

This was the vacuum pre-heating pasteuriser machine with its juice extractor and refining equipment. All other necessary mechanical processes are carried out by British machines adapted for the purpose and of the type for canning

The plant had only just been installed and the laboratory experiments successfully concluded when the call came for immediate action, not in small quantities by way of experiment, but at full pressure for a twenty-four hour day. It was a test that not even the most optimistic management could have bargained for, but they faced up to it, and with the help of volunteer labour recruited to work nightshifts, a large proportion of the crop which would otherwise have had to be dumped was saved and, in addition, a new industry was born which could supply the English home market.

Inside the factory, showing the vacuum pre-heating pasteuriser with juice extractor and refining equipment.

To the uninitiated visitor there is nothing spectacular in the process of making tomato juice. The essential factor is the pre-heating machine, which contains a series of pipes somewhat akin to a steam radiator. It is here, in the nerve-centre of the operation, that the real work is concentrated, and the success or failure of the product determined.

Processing Operations

On arrival at the factory the tomatoes are tipped from the lorries or farm carts on to a conveyor belt, which carries them straight to the rotary washer. After cleansing, they pass along a sorting tray where workers pick them over by hand, taking off all stems and discarding unfit fruit.

The fruit then passes through the chopper where it is reduced to a fine pulp, which is then pumped through a series of tubes situated in the lower part of the pasteuriser. Next it enters the juice extractor, where the skins, cores, seeds, etc., are segregated, the pure juice alone returning to pass through the tubes situated in the upper portion of the preheater, in which it is raised to a temperature of 180° F. It is then pumped up to a collecting tank whence by gravity it flows into the filling machine, with a capacity of sixty cans per minute, irrespective of size. The two containers used are the 16 oz. and 32 oz. varieties.

Leaving the filler the cans are sealed and immediately conveyed to the automatic rotary cooker, in which they are processed for fifteen minutes at a temperature of 212° F., after which they are given ten minutes in a cooling tank before being dried off and labelled.

Factory Output

The output of the factory depends on the size of can being filled. With the popular 16 oz. size the limit is two tons of fruit per hour, but with the 32 oz. this is almost doubled. Production at its height is about a thousand cases per twenty-four hour day.

This may not be sufficient to supply the home market, but during the first season it was not possible to arrange for regulated supplies of fresh fruit. That year it was a question of absorbing what was already picked before it got too ripe. In future it is hoped, with the aid of cold storage facilities, to be able to accommodate and absorb any temporary glut and also to spread the season over the whole year, thereby guaranteeing a regular supply to meet the increasing demand.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Ministry of Food

Latest Statutory Instruments

The list given below is the continuation of the list of Orders published in *Food Manufacture*, August 1, 1949, page 359.

No.	*Date.* 1949.	
		PRICE FIXATION
1254	July 10.	Order amending the Rabbits and Hares (Control and Maximum Prices) Order, 1944.
1287	„ 10.	Order amending the Milk (Control and Maximum Prices) (Great Britain) Order, 1947. Revokes S.I. 1949, No. 525.
1303	„ 17.	Order amending the Meat Products and Canned Meat (Control and Maximum Prices) Order, 1948.
		COFFEE ESSENCE
1282	July 10.	Order revoking the Coffee Essence (Control) Order, 1942.
		FEEDINGSTUFFS
1160	July 1.	Order amending the Feedingstuffs (Prices) Order, 1949.
		FISH
1297	July 18.	The Fish (Port Allocation Committees) Order, 1949. Revokes S.R. & O. 1943, No. 1657; S.R. & O. 1945, Nos. 820 and 1567; S.R. & O. 1946, No. 941.
		LABELLING
1161	July 1.	Order revoking the Labelling of Food (General Licence) Order, 1947.
		LIVESTOCK
1253	July 10.	The Livestock (Sales) Order, 1949. Revokes S.R. & O. 1943, Nos. 213 and 1027.
		OIL
1190	July 1.	Order revoking the Cod Liver Oil and Veterinary Oil (Control) Order, 1943.
		RATIONING
950	May 22.	The Food Rationing (General Provisions) Order, 1949. Revokes S.I. 1948, Nos. 1631, 1885, 2197, 2319, and 2583; S.I. 1948, Nos. 1587, 1822, 1901, 2414, 2635, and 2848; and 1949, Nos. 147, 303, 542, and 780; S.I. 1948, No. 1633; S.I. 1948, Nos. 1636, 1821, 2532, and 2621; and 1949, Nos. 146, 541, and 880; S.I. 1948, No. 1635; and 1949, Nos. 506 and 777; S.I. 1948, Nos. 2599 2706, and 1949, No. 700.
972	„ 22.	The Fats, Cheese and Tea (Rationing) Order, 1949.

Locust Bean Gum

C. GRIFFITHS, A.M.C.T., A.R.I.C.

From the beans of the locust, the fruit immortalised in the Bible as the food of St. John the Baptist, is extracted a gum which, as a thickening agent for pharmaceuticals and foods, is about five times as effective as starch. That demand for this gum is steadily rising is shown by the fact that annual production in Great Britain alone is now in the region of 750 tons. The chemistry and uses of locust bean gum are discussed in this article, which includes the results of recent work on its viscosity characteristics.

LOCUST BEAN GUM, carob gum, or gum gatto, is obtained from the seeds of *Ceratonia siliqua*, a tree indigenous to the coastal regions of the Mediterranean countries and cultivated chiefly in Spain, Portugal, Cyprus, Palestine, and the Balearic Islands. The history of the cultivation of the tree dates back to several centuries B.C., for its fruit had long been valued as a cattle food and, in times of shortage, for human consumption. The name *Johannesbrot* (St. John's Bread), given to the fruit by the Germans, recalls the time when St. John subsisted in the wilderness on locusts and wild honey.

The beans have been used extensively for tobacco curing and are bought in Germany for roasting as a coffee substitute. Today they have found their way back into sweet shops in Great Britain as children's sweetmeats.

The tree begins to bear fruit when four years old, by which time it has attained a height of about 3 feet. The pods, which grow to a length of between 6 and 12 in., ripen in late summer or early autumn and contain from eight to twelve seeds which are the source of the gum. The pods are dried and the seeds, or kernels, are removed by hand or machine. They represent some 10 per cent. of the weight of fruit and are dark brown, very hard, rather flat objects about ¼ in. in diameter. Packed into sacks they are imported into Great Britain and elsewhere for extraction of the gum. The pods themselves are used for cattle food, and also for preparing syrup extracts from which wines are fermented.

Extraction of the Gum

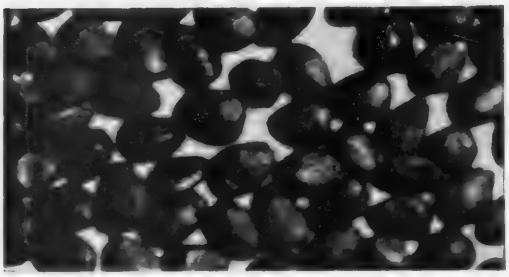
The seeds contain a central hard, yellow embryo or "Yellow Meal" as it is sometimes called, which is a valuable by-product from locust bean gum manufacture. It is used almost exclusively as a cattle food, but its composition, and from the foodstuffs' point of view its purity, warrant consideration of the possibility of its use in human foodstuffs.

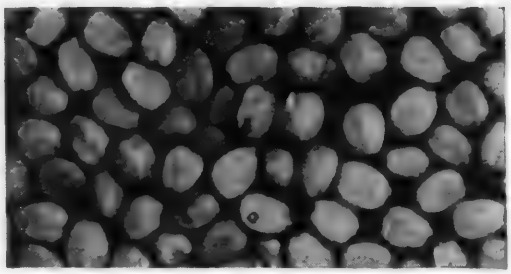
Its composition is fairly constant, and a typical analysis is as follows:

	Per Cent.
Protein	44·67
Moisture	9·20
Mineral matter (ash)	5·53
Cellular tissue	3·40
Carbohydrate	37·20
	100·00

This embryo is surrounded by a hard, brittle, and comparatively large layer of white, semi-transparent endosperm; this is the desired gum. The endosperm, in turn, is surrounded by a tenacious, dark brown husk.

Successful production of the gum involves separation of the endosperm from the embryo and the quality of the gum (*i.e.* whiteness and freedom from brown specks) depends on efficient removal of the outer husk. This is first removed either by chemical attack or by mechanical abrasion. Then, by an ingenious mechanical process, the de-husked kernels are split lengthwise and the embryo separ-





The three photographs illustrate respectively full-size locust kernels, the kernels after removal of the husk, and after removal of the embryo in preparation for grinding.

ated from the gum by taking advantage of differences in hardness and friability of the two components. Presence of the yellow embryo in the gum increases the rate of fermentation of the gum solution and its removal, therefore, is important. Finally, the gum is powdered and graded according to its particle size and colour, the yield of gum amounting to approximately 35 per cent. of the weight of kernels. All the operations are controlled so as to ensure that the product conforms to the standards of the Foods and Drugs Act, since it is used to a considerable extent in foodstuffs.

Chemical Composition

The commercial product shows a slight variation in the proportion of its component, but an average analysis of several samples of gum derived from Cyprian and Portuguese kernels is as follows:

	Per Cent.
Galactomannan	83·05
Pentosan	4·10
Nitrogen expressed as protein ..	5·88
Mineral matter (ash)	0·65
Cellular tissue	1·32
Moisture	5·00
	100·00

The galactomannan has recently been investigated by Hirst and Jones,[1] who have shown it to be a branched chain polysaccharide built up of about 84 per cent. D-mannose units and about 16 per cent. D-galactopyranose units. They postulate two possible methods of linkage of the units.

Preparation of Solutions

There is a simple but definite technique for preparing solutions of locust bean gum. It is useless to stir the gum straight into hot water or to paste the gum out in cold water first and then dilute with hot water. In either case gelatinised lumps of solid gum are formed which are difficult to disperse.

The gum powder should be stirred into the full amount of cold water and then brought to the boil with stirring. For most purposes a 1 per cent. to 2 per cent. solution prepared in this way is sufficient. Preparation of more viscous solutions and jellies may be made by stirring 3 per cent. to 4 per cent. of gum into a 0·25 per cent. borax solution at 80° C. and then quickly adding dilute acetic acid until the solution is just acid to litmus paper. The borax prevents the gum from dissolving until the *p*H of the solution has been lowered to a sufficient degree. The effect of borax on gum gatto is described below.

A third method of preparing a solution is to mix the gum into a pourable cream with alcohol and add this to cold water. An even suspension of the gum is obtained which may be boiled or left to dissolve in the cold.

Solutions of the gum are stable for from two to five days, and if they are to be kept for longer periods a preservative is necessary; 0·25 per cent. of cresylic acid, formalin, or chlorophenols is quite effective.

Viscosity of Locust Bean Gum

Because its thickening power is the most valuable characteristic of locust bean gum, the viscosity of its solutions is its most important physical property. As a thickening agent it is about five times as effective as starch, weight for weight, and twice as effective as some grades of gum tragacanth.

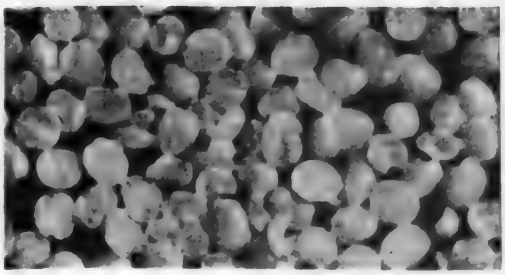
Viscosity of locust bean gum solutions is affected by three factors: (1) the particle size of the solid gum, (2) temperature, and (3) concentration.

The following results were obtained by the falling sphere method,[2] and all solutions were prepared by raising a cold suspension of the gum to the boil and holding it there for two minutes and then cooling back to the required temperature.

Effect of Particle Size on Viscosity

One per cent. solutions at 20° C.

B.E.S.A. Mesh Size.	*Viscosity in Poises.*
80-100	25·10
100-120	40·85
120-150	39·00
150-200	35·80
200-300	30·20
Over 300	13·20



Thus the highest viscosities are given by particles between 100 and 300 mesh. Below 100 mesh the particles are too large to give complete solution, and even if this solution is given prolonged boiling there is little if any change in viscosity. Above 300 mesh the viscosity declines sharply, due probably to disruption of the molecule aggregates. The above results are expressed graphically in Fig. 1.

Effect of Temperature on Viscosity

Sample *A* is a standard grade of the gum giving the following mesh analysis:

Mesh.	*Per Cent.*
80-100	21·5
100-120	13·8
120-150	20·7
150-200	20·5
200-300	12·5
Over 300	11·0

Sample *B* is the 100 to 120 mesh fraction of this gum, *i.e.* the fraction giving the highest viscosity.

Temperature °C.	*Viscosity in Poises of 1 Per Cent. Solution.*	
	A.	*B.*
10	69·14	72·12
20	38·60	41·20
30	27·40	28·30
40	18·73	19·50
50	13·82	13·90
60	9·49	9·56
70	6·81	7·00
80	4·08	4·40
90	2·52	2·83

The results obtained on *A* are expressed graphically in Fig. 2.

Hart[3] has compared the viscosities of various strengths of solutions of locust bean gum by timing the flow of solution from a graduated pipette, but owing to the limitations of the apparatus he was unable to obtain values for concentrations above 0·75 per cent. and his figures are comparative only. Mantell[4] gives the viscosity of locust bean gum as eight poises for a 1 per cent. solution, and 325 poises for a 2 per cent. solution. These figures suggest a poor quality gum and, in fact, Mantell gives these figures for a "coarse grind" gum and shows even lower figures for a "fine grind" gum. Mason,[5] in a review of water dispersible and bulking gums, complains of the lack of technical data on the properties of these solutions, but the data here given should fill this gap. The following figures obtained on *A* are illustrated graphically in Fig. 3; both *A* and *B* are as before.

Concentration (Percentage by Weight).	*Viscosity in Poises at 20° C.*	
	A.	*B.*
0·25	1·20	1·20
0·50	1·89	1·89
0·75	10·05	10·20
1·00	38·60	41·20
1·25	103·70	114·40
1·50	232·00	270·30
1·75	Approaching semi-solid	

At 2 per cent. the gum is a semi-solid and at 4 per cent. it is a firm jelly.

A solution of locust bean gum gives the following reactions:

Fehling's solution	No change. Reduced if the gum is first hydrolysed with mineral acid.
Iodine solution	No colour.
Basic lead acetate	White ppt. Mixture gels.
Tannic acid	White ppt.
Schiff's reagent	No colour.
Caustic soda	Yellow colour. Solution clears. Slight drop in viscosity.
Sulphuric acid (Conc.)	Clear yellow solution.
Borax solution	Gels.

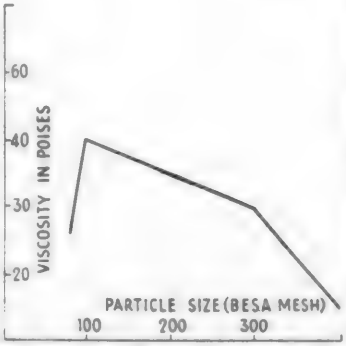


Fig. 1. Effect of particle size on viscosity at 20° C.

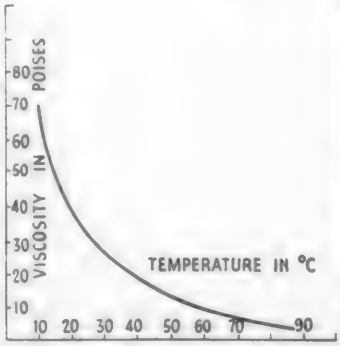


Fig. 2. Effect of temperature on viscosity of a 1 per cent. solution.

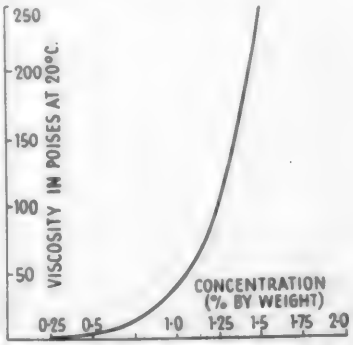


Fig. 3. Effect of concentration on viscosity.

The degree of gelling caused when borax reacts with locust bean gum is quite phenomenal. Therefore, this reaction affords a sensitive and specific test for locust bean gum. The test solution should be neutral and a 1 per cent. solution is converted into a firm rubbery gel on addition of a few drops of weak borax solution. This gel (99 per cent. water) can be handled much the same as a soft, spongy rubber. Hart (*loc. cit.*) has used this reaction for detecting and determining boric acid and borates.

Uses in the Food Industry

The thickening properties of locust bean gum have resulted in its extensive use in the food industry for preparing such products as sauces, tomato ketchup, salad creams, and lemon cheese. It is used as a stabiliser in ice cream mixtures, particularly in the U.S.A., and in the sweet and confectionery trade it has been found useful as a binding agent in lozenge and tablet manufacture.

Locust bean gum leaves a smooth, fairly tough, transparent film and, because of this, it has been adopted as a size and finish for many textiles. It makes an admirable thickening agent for calico printing and has been shown to be superior to *Colloresine* (a methyl cellulose) for the printing of vat colours.

The gum has limited adhesive properties and cannot, in this respect, be compared with glue or gum arabic.

Locust Bean Gum and Paper Fibres

Addition of certain colloids to solutions used for tanning leather causes more even and rapid penetration; locust bean gum is one of these colloids. It has also been shown that the gum has marked dispersing action on paper fibres, and when it is added to paper pulp very uniform paper results.

The author thanks Ellis Jones and Co. (Stockport), Ltd., for providing facilities for carrying out the original work described in this article.

REFERENCES

[1] Hirst and Jones, *J.C.S.*, 1948, p. 1278.
[2] B.E.S.A. Specn. No. 188—1937.
[3] Hart, *Ind. Eng. Chem.* (Anal. Ed.), 1930, **2**, p. 329.
[4] Mantell, "The Water Soluble Gums," Reinhold Pub. Corp., New York, 1947.
[5] Mason, *Chem. Ind.* (U.S.A.), 1944, **54**, p. 66.

Dried Pineapple

IN the note under the heading "Dried Pineapple," published on page 367 of the August issue of FOOD MANUFACTURE, the price of dried apricots in the United Kingdom was stated to be 1s. a lb. This should have read 1s. 9d. per lb.

Feeding through Five Centuries

THERE is so much useful and interesting information about food and food habits in a recent book* that it hardly seems to matter whether it fulfils any declared purpose. In any case, the title and subtitle have something of a clash in purposes; for the rather pontifical title suggests a broad survey of eating practices, while the sub-title, "The History of Industrial Feeding," is much more precise. The first half of the book is indeed a broad survey of food and eating customs from the Middle Ages to about 1820, while the second half is a definite study of the development of factory canteens from Robert Owen's pioneering days to the present time. Nevertheless, if readability is the supreme test of a book, it cannot be said that this one has failed by falling between two stools. It is, however, a book that is a little harder to classify for subject than its author may suppose.

Industrial Catering

The student of industrial catering will probably have two criticisms to make. First, the historical approach to modern developments is too long and over detailed. However true it is that the modern canteen for eight thousand meals a day is linked genealogically with the medieval manor-house, the author takes a good deal of space to establish this and other similar relationships with the non-industrialised past. Secondly, in his account of the development of modern industrial feeding he finds little room for such practical matters as equipment, economics, or organisational details. Having devoted so much space to the period up to 1820 or thereabouts, he has to concentrate upon the development of modern canteens as an idea and as an aspect of general welfare and nutrition. In short, if we take the book solely as a study of industrial feeding, it displays a few faults of balance.

One Man's Meat . . .

But here one man's meat is another's poison, and for the student of food and eating much of the author's historical matter will be of great value, and, indeed, of far greater value than details of the mechanics of modern canteens would have been. Sir Noel Curtis-Bennett will not object to the comment that this is a "documentary" rather than a "personal viewpoint" book. It is considerably built up upon quoted extracts from a wide range of ancient and modern sources of information; but it is none the worse for that, for these have all been effectively selected. Early in the book are verses of the fifteenth century describing methods of selling food in London; two hundred pages later we are reading extracts from the 1939 booklet of the Industrial Welfare Society, "Canteens in Industry."

* *The Food of the People.* By Sir Noel Curtis-Bennett, K.C.V.O. Pp. 320. Faber and Faber, London. Price 16s. net.

As an example of the incidental offerings in this book there is an excellent report of the food rationing system of the First World War. The reference value of this item is high, for there are few books giving a concise account of those details of our earlier rationed past.

Food Control is not New

The numerous freedom-lovers who oppose some of our food control orders of today will find plenty to think about in the first half of this book. The basic principles of our current edicts are neither new nor un-British. In the Middle Ages there were maximum prices for a wide range of foodstuffs. In 1363 the pillory was the penalty for black market offences. A victualler was not allowed to "conceal his victuals which he has to sell," and if he withheld any victuals until they became "corrupt or stinking" the penalty was severe. Meatless days or "fish days" were frequently enjoined; they were "expressly dissociated from any religious significance," and were intended to assist the fishing industry on the one hand and to avoid over-killing of young cattle on the other.

The limitation on the number of courses in a meal of this century is only a re-echo of an enactment of Edward II: "No man shall cause himself to be served in his house or elsewhere . . . with more than two courses, and each mess of two sorts of victuals at the utmost be it flesh or fish. . . ." There are so many pages packed with this kind of detail that this book must be recommended as a liberal miscellany in the first place, and as one with a purpose in the second place.

There is, for example, an excellent treatment of the introduction of new foods to the English diet in the sixteenth century; there are numerous accounts of the mighty menus of the rich and the royal in Tudor days, to be compared some fifty pages later with the parish and workhouse diets of successive centuries. From time to time the author quotes food price lists, and usually compares these with current wage rates for the same period in history.

Rise of Catering in Industry

If more has been said here about the first half of the book, it is because this will probably have greater value for the general reader. Nevertheless, from the time of Owen onwards, the rise of catering in industry is clearly described. We see how enlightened firms like Frys, Cadburys, Rowntrees, Lever Bros., and others followed Owen's lead. When the 1914-1918 war came there were enough canteens in progressive factories to establish the necessity for canteens in munition factories. After this period of stimulation, however, the canteen idea fell into apathy; bad canteen management and industrial depression combined to defeat progress, and workers and management alike were uninterested in the possibilities of industrial feeding. But by the early thirties progress broke through once again. Advances in our knowledge of nutrition on the one hand and of factory management and welfare on the other were now the stimulating influences.

We had a substantial breadth of experience to utilise when the second war broke upon us. This time it was not only munition factories which had to provide suitable canteens, but every factory employing 250 or more workers. Firms which specialised in providing and organising factory catering came to the fore in these developments of our own time. By January, 1945, 50 million meals a week were being served in factory canteens and British Restaurants.

This book can be recommended both for enjoyable first reading and for great subsequent usefulness as a reference work.—D. P. H.

Production of Sherries

Two processes for producing sherry were described by E. M. Brown and Myron Nightingale at a recent meeting of the Division of Agricultural and Food Chemistry of the American Chemical Society.

The first, the Spanish or Flor process, for the production of Spanish sherries, consists of the use of a film-forming yeast which grows on the surface of the fermented juice and imparts to the wine a distinctive flavour and bouquet. These sherries are generally known as Flor sherries. In Spain, a particular system known as the Solera system is used in order that the flavours produced by the Flor yeast will be promoted or enhanced, while at the same time the resulting blending and ageing of the wines result in a uniform product over a long period of time.

In the second, the artificially baked or Californian process, a wine is used which has been fortified to between 20 per cent. and 21 per cent. alcohol by means of high-proof brandy, after which this wine is artificially baked by means of coils in tanks or by other steam heating method at a definite temperature (130° F.) over a period of three to five months.

The baking process produces the baked flavour or "rancio" characteristic of this type of sherry. After the baking process, it is necessary to hold this wine under storage for at least a year, in order that the wine may become palatable.

Both processes are characterised by certain chemical and physical reactions determined to some extent by cellar practices to which they are subjected and to the various sub-types of sherries that are produced according to commercial demand.

Weighing the experimental packages of frozen oysters in the refrigerating room to determine the amount of moisture loss.

Samples of frozen oysters are examined from twenty different containers and subjected to bacteriological and chemical tests.

Oysters all the Year Round

Sample packages are removed from the refrigerator prior to preparation for the tasting panel.

Investigatory work is being conducted by the U.S. Fishery Technological Laboratory to find the ideal solution to the problem of successful packaging of frozen oysters for year-round consumption. Testing containers vary from specially treated Cellophane and paper bags to waxed fibreboard, cans, and glass jars.

THE U.S. Fishery Technological Laboratory at College Park, Maryland, a scientific institution for the study of the role of fish in food industries, conducted recently a thorough investigation in connexion with frozen oysters, based chiefly on the work of tasting panels, and for ascertaining the most suitable type of wrapping material.

Storage Tests

Frozen oysters from twenty different types of containers were studied in the experimental kitchen

Above: **After thawing, the oysters are plunged into frying fat, one sample being taken from each of the twenty packages for cooking.**

Top right: **The tasting panel is given one oyster each from the twenty packages to determine which package is best adapted for storing frozen oysters.**

Middle right: **Some experimental packages have been made of thin cardboard.**

Bottom right: **Other experimental containers for packing oysters have been made of aluminium, tin, glass, and cardboard.**

of the Laboratory, and were subjected to various tests to determine how well they had kept during months of freezing.

Preparing the Oysters

Each package of frozen oysters was weighed in order to determine the amount of moisture loss. After removal from the container, the oysters were thawed and plunged into frying fat in preparation for the final tasting test. Each member of a five-man tasting jury took oysters from the twenty different kinds of packages to determine which package was best adapted for keeping frozen oysters. Three points were allotted for appearance, four for flavour, and three for texture.

Studies on Wrapping Materials

Separate studies were also conducted on the various types of wrapping materials for frozen oysters. These materials included Cellophane, Pliofilm, aluminium foil, polyethylene, Saran, vinylite, and freezer papers.

Preservation of Fruit Juices with Less SO_2

K. VAS* and M. INGRAM, M.A., Ph.D.
Low Temperature Station for Research in Biochemistry and Biophysics, University of Cambridge, and Department of Scientific and Industrial Research.

Cruess, Richert, and Irish[1] observed that there is a striking difference between amounts of SO_2 needed to prevent growth of micro-organisms at different *p*H values. At *p*H 3.5, 2-4 times as much SO_2 was needed as at *p*H 2.5 while, at *p*H 7, sulphite seemed to be quite ineffective against yeasts and moulds and as much as 1,000 p.p.m. was required to stop the growth of bacteria. These workers hinted that the antiseptic properties might be confined to undissociated H_2SO_3, to HSO_3' ions, or to molecular SO_2, and be absent from SO_3'' ions. Later Rahn and Conn[2] showed that 4 p.p.m. of undissociated H_2SO_3 can inhibit *Saccharomyces ellipsoideus* while 100 p.p.m. of HSO_3' ions can inhibit bacterial growth. Still more recently, Gillespy[3] found that the action of SO_2, in increasing the heat-sensitivity of the asci of *Byssochlamys fulva*, is likewise a function of *p*H and he, too, considered that non-ionised H_2SO_3 was probably the lethal agent.

THE theoretical relation between the *p*H of a solution and the proportions of undissociated sulphurous acid, HSO_3' and SO_3'' in it, is shown in Fig. 1, calculated according to Michaelis[4], taking the first dissociation constant of H_2SO_3 as $K_1 = 1{\cdot}7 \times 10^{-2}$, and the second, $K_2 = 5 \times 10^{-6}$.

It is seen that, from *p*H 3·5 downwards, even slight alterations of *p*H cause substantial changes in the proportion of the total SO_2, which is in the non-ionised form. There is thus good reason to suppose that slight additions of acids will correspondingly reduce the amount of SO_2 necessary to prevent spoilage in fruit products.

To test this supposition experiments have been carried out with orange juices acidified to different *p*H values with conc. aq. HCl (31 per cent. w/w) and, as a preliminary, the quantities of conc. HCl which must be added to concentrated and "straight" orange juices to give samples covering a *p*H range were determined (see Table I).

* Of the Institute of Food Chemistry of the University of Technical Sciences, Budapest XI; working on a Hungarian State Scholarship.

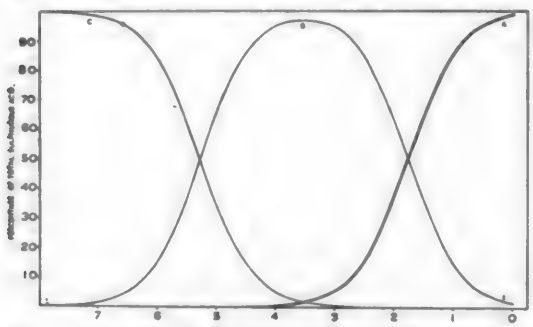


Fig. 1. Calculated relation between pH and the proportion of the forms in which sulphurous acid is distributed. Combined SO_2 plays no part in these equilibria. Curve A: non-ionised molecule; Curve B: HSO_3' ion; Curve C: SO_3'' ion.

TABLE I

ACIDIFICATION OF ORANGE JUICE

Type of Juice.	*Conc. HCl, ml. per 100 ml. Juice.*	*pH.*	*Ml. HCl required to reduce pH by 0·1.*
Concentrated Valencia juice (65° Br.)	0	3·43	
	1·00	3·13	0·330
	1·50	2·98	
	1·80	2·89	
The same, diluted 1:1·5 (100 g. juice+50 g. water)	0	3·53	
	0·13	3·47	
	0·40	3·37	
	0·67	3·25	
	0·93	3·14	0·360
	1·20	3·03	
	1·47	2·92	
	1·73	2·81	
	2·00	2·70	
Concentrated Shamouti juice (65° Br.) diluted 1:2 (500 g. juice+100 g. glucose+100 g. sucrose+200 g. water)	0	3·33	
	0·40	3·05	0·300
	0·50	3·00	
Straight Shamouti juice (canned)	0	3·20	
	0·05	3·12	
	0·10	3·04	
	0·15	2·95	0·058
	0·20	2·86	
	0·25	2·77	
	0·30	2·68	
	0·40	2·48	

For other fruit juices Pederson and Beattie[5] showed that 100 ml. portions of straight juice usually required about 0·03 to 0·08 ml. 31 per cent. w/w. HCl for a *p*H change of 0·1 unit, cherry and currant being the most highly buffered, and quince the least. The values observed for orange juice are of similar magnitude, bearing in mind that concentrated juices require more acid, in rough proportion to the degree of concentration.

Acidification and Keeping Qualities

The effect of acidification with conc. HCl on keeping qualities has been tested in three experiments, the first with plain concentrated juice, the two latter with concentrated juices with sugar syrups added.

Plain concentrated juice.—Canned Valencia juice, concentrated to 65° Brix, was treated as follows:

> The concentrate, of *p*H 3·40, was acidified to *p*H 2·88 with 1·8 ml. 31 per cent. HCl per 100 g., bottled, SO_2 added and allowed to equilibrate at room temperature for five days. The sulphited samples together with controls were then inoculated from a fermenting concentrate, to give 5×10^3 yeast cells/ml. initially, and incubated at 25° C. At intervals, plate counts were made after incubation at 25° for three days on Bacto Potato Dextrose Agar[6]—a procedure previously found satisfactory.

The results are illustrated in Fig. 2. It is evident that, in general, the lag period was extended by SO_2. With only 90 mg./l. added SO_2, the effect was slight at *p*H 3·40 but quite marked at *p*H 2·88. Moreover, the lag and general shape of the growth curves is very similar with 90 mg./l. SO_2 at *p*H 2·88 (B. 1) and with 270 mg./l. at *p*H 3·40 (A. 2), there being about 1·5 mg./l. in the undissociated form in both cases (undissociated fractions: 2·26 per cent. at *p*H 3·40 and 7·17 per cent. at *p*H 2·88 of that proportion of the total SO_2 which remains free, *i.e.* about 25 per cent.). It may be seen, from comparison of the curves at the different *p*H values in the absence of SO_2, that the differences due to acidity alone are quite insufficient to account for the difference in behaviour actually observed.

Orange juices plus sugar syrups.—In these tests the development of yeasts was followed merely by observing the onset of fermentation.

> (i) To 1,000 g. of 65° Brix Valencia juice 1,000 g. water were added and the solution filtered through cheese-cloth. To 1,800 ml. of filtrate were added 300 g. sucrose and 150 g. glucose; one-half was acidified from *p*H 3·52 to *p*H 2·45. Both portions of the juice were distributed in aliquots of 100 ml. in 6 oz. screw-capped bottles, and different amounts of SO_2 were added as $Na_2S_2O_5$. After standing for several days at 25° C. to reach equilibrium between free and combined SO_2, all samples were inoculated with 1 ml. of a fermenting juice to bring the concentration of yeasts to about $1{\cdot}6 \times 10^6$ cells/ml. The samples were incubated at 25° C., and the time was recorded for the onset of fermentation (strong frothing when gently shaken and typical change in odour). Fig. 3 (i) illustrates the results.
>
> (ii) To 500 g. of 65° Br. Shamouti juice, 200 g. sucrose, 100 g. glucose, and 200 g. water were added.

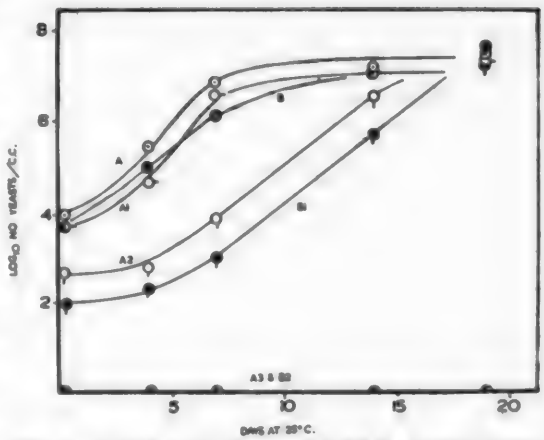


Fig. 2. Growth curve of yeasts, at 25° C., in the presence of various amounts of SO_2 at different pH values:

pH 3·40—A,	**0 mg. SO_2/l.**	**pH 2·88—B,**	**0 mg. SO_2/l.**
A1,	**90 ,,**	**B1,**	**90 ,,**
A2,	**270 ,,**	**B2,**	**270 ,,**
A3,	**560 ,,**	**B3,**	**560 ,,**

> The mixture, which was not filtered, had a *p*H value of 3·33, and one half was acidified to *p*H 3·00. Both halves were bottled, SO_2 added and equilibrated, as before, in lots of 50 g. All samples were then inoculated with fermenting juice to give $1{\cdot}1 \times 10^6$ yeast cells/ml., and incubated and observed as above. Fig. 3 (ii) gives the results.

Figures 3 (i) and (ii) further demonstrate the important effect of *p*H on the preserving power of SO_2, which is much greater than the direct effect of *p*H. In the first experiment, fermentation took place about ten times more rapidly at *p*H 3·52 than at *p*H 2·45; and in the second experiment, about twice as rapidly at *p*H 3·33 as at 3·00. These ratios are, in fact, roughly in inverse relation to the expected quantities of undissociated sulphurous acid at these *p*H values: (1·5 per cent. at *p*H 3·52 against 17·3 per cent. at *p*H 2·45; and 2·65 per cent. at *p*H 3·33 as against 5·53 per cent. at *p*H 3·00); *cf.* Fig 1.

The results of all these experiments demonstrate that the preserving power of a given quantity of SO_2 can be related to the amount present in the undissociated form. As little as 1·5 mg./l. gives appreciable inhibition (curve A2, B1 in Fig. 2); concentrations of 3·2 and 4 mg./l. completely prevent growth (curves A3, B2). This confirms the view of Rahn and Conn[2], that it is the undissociated form which is active against yeasts, although in our experiments a yeast was used (an osmophilic *Zygosaccharomyces*) very different from that which they tested.

The full position, therefore, regarding the use of SO_2 as a preservative in fruit juices, is that a large part of it combines to form bisulphite-compounds with sugars, aldehydes, etc.; and this combined sulphurous acid is ineffective against micro-organisms.[6] But even the remaining "free" fraction

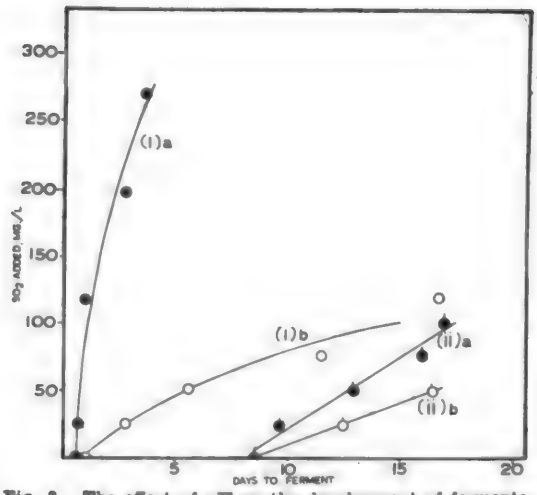


Fig. 3. The effect of pH on the development of fermentation, at 25° C., in the presence of various amounts of SO_2:
Expt. (i)a—pH 3·52 Expt. (ii)a—pH 3·33
(i)b—pH 2·45 (ii)b—pH 3·00

(which may be very small in concentrated products) is far from wholly active, since only the undissociated part of it has anti-fermentative properties. This non-ionised fraction is a function of *p*H, and at the usual acidities it is a very small fraction even of the free SO_2 content. Thus, preservation with sulphurous acid or its salts involves the use of a large, ineffective bulk of preservative (combined + ionised) to provide and maintain a small highly active (non-ionised) portion.

The proportion of the free SO_2 in the undissociated form rises from 0·5 per cent. at *p*H 4 to 5·5 per cent. at *p*H 3, so that even quite small shifts of *p*H towards more acid values (especially from *p*H 3·5 onwards) greatly enhance the preservative value of added SO_2. Conversely, at a lower *p*H the same preserving power is obtained with less total SO_2; and since sulphurous acid in quantity causes loss of aroma and other organoleptic changes, as well as being physiologically undesirable, it is important to use as little as possible. A means of greatly reducing the ineffective bulk, and therefore the total quantity needed, is by slightly lowering the *p*H by the addition of harmless acids.

The quantities of a strong acid needed to produce minor changes are quite small (Table 2), since the buffering capacity of the juices is relatively low.

The amounts of some organic acids (citric, tartaric, malic) needed to produce a certain *p*H change in fruit pulps and jams can easily be calculated from the formulae given by Hinton.[7] Diluted orange juice concentrate, however, when acidified to a given *p*H with citric or tartaric acid, tastes much more sour than with HCl. The order of increasing sourness (at the *p*H levels of 3·0, 2·7, and 2·4 respectively) was found to be HCl < < tartaric < citric (*cf.* [8, 9]). It seems, therefore, that any considerable lowering of *p*H would best be produced by adding HCl which, in this experiment, did not make the juice too sour even at *p*H 2·5 to 2·7; while tartaric, and especially citric, acid made the juice too sour, even at a final *p*H of 2·8.

TABLE II

CALCULATION OF AMOUNTS OF SO_2 TO BE ADDED TO A DILUTED (1+5) SHAMOUTI ORANGE JUICE CONCENTRATE (65° BRIX) AT DIFFERENT *p*H VALUES, TO GIVE AN INHIBITING CONCENTRATION (4 P.P.M. AS SO_2) OF UNDISSOCIATED SULPHUROUS ACID.

*p*H.	*Undissociated Portion of Sulphurous Acid, as Per Cent. of the "Free" SO_2.*	*Total SO_2 Required* (p.p.m.).*	*Acid Required to bring the pH of the Juice (from 3·44) to the Indicated Value (g./100 ml.).*		
			HCl.	*Tartaric.*	*Citric (Monohydrate).*
3·44	2·05	390	0	0	0
3·04	5·05	160	0·07	0·4	0·7
2·74	9·60	83	0·12	1·1	1·8
2·44	17·60	45	0·18	2·3	4·0

* Assuming 50 per cent. combined.

In the handling of juices and pulps, particularly those not very acid originally, it would often be possible to add small quantities of acid. It is possible, therefore, to replace a large part of the undesirable preservative with a harmless compound.

It should be remembered that acidity has an important secondary effect: the combination of SO_2 with sugar, etc., is greatly delayed by increasing the acidity—a decrease of only 0·3 *p*H units roughly halves the rate of combination.[10] Thus, not only does acidification increase the H_2SO_3 fraction of the free SO_2, but there is for a longer time a greater quantity of free SO_2 from which the H_2SO_3 fraction may be drawn. In the above experiments, acid and SO_2 were added and time was allowed for equilibrium to be reached, before the yeasts were added, so that the quoted amounts of SO_2 could really represent those attacking the yeasts. In a practical case, on the other hand, the SO_2 is usually added last; and the quantity of free SO_2 will be much greater than that finally left at equilibrium, for a considerably longer time if the solution has been acidified.

The work described above was carried out as part of the programme of the Food Investigation Organisation of the Department of Scientific and Industrial Research.

REFERENCES

1. Cruess, Richert, and Irish. *Hilgardia*, 1931, **6**, 295.
2. Rahn and Conn. *Ind. Eng. Chem.*, 1944, **36**, 185.
3. Gillespy. *Ann. Rep. Fruit and Veget. Preserv. Stn. (Campden)*, 1940, p. 54, and 1946, p. 31.
4. Michaelis. Hydrogen Ion Concentration, Williams and Wilkins, Baltimore, 1926, p. 56.
5. Pederson and Beattie. *Food Research*, 1943, **8**, 405.
6. Ingram. *J.S.C.I.*, 1948, **67**, 18.
7. Hinton. *J.S.C.I.*, 1947, **66**, 381.
8. Beatty and Cragg. *J.A.C.S.*, 1935, **57**, 2347.
9. Eichholtz. Sauerkraut und ähnliche Gärerzeugnisse, Viehweg, Braunschweig, 1941, p. 102.
10. Vas. Data in course of publication.

Personal Injuries Legislation

THE Law Reform (Personal Injuries) Act, 1948, is a measure of which cognisance should be taken, as the matters covered may concern any person or firm, whether in a private or business capacity, and it applies whether the injury occurs at work or otherwise. This measure, which has really arisen through the passing of the National Insurance Acts, alters the law concerning injuries and the damages which may be allowed, and also alters the legal doctrine of common employment.

As regards injuries at work, under the Workmen's Compensation Acts an injured employee could apply for compensation from his employer, either through those Acts or by an action at common law, for lump sum damages. Compensation could be obtained by either method but not by both, hence the term "alternative remedies" which has been commonly used in this connexion. The coming into operation of the National Insurance schemes has changed all this, as practically everyone is now under one or the other of the schemes, whether an employed person or a self-employed person, and so eligible for benefits by weekly payments.

The proposition has been advanced that, when assessing damages in common law actions, regard should be had to the fact that a sum for benefits under the National Insurance schemes will be payable to the injured person, and so the wrongdoer should not also be called upon to pay damages, since he is probably insured under the schemes and pays contributions which provide the benefits.

The foregoing proposition has been partly accepted, the Act providing that in assessing any damages which may be awarded for personal injuries in a case, the court must take into account one half of anything which may be available for industrial injury benefit, industrial disablement benefit, or sickness benefit under the National Insurance schemes during the five years beginning when the cause of action arose.

Although this Act requires the court to take note of the injured person receiving these insurance benefits, it does not require the court to make any reference to this in its award. The court thus has discretion as regards publication, as it has in other matters such as amounts for loss of earnings or profits attributable to the injury, damages for pain and suffering, etc., which may be taken into account in actions for personal injuries, but it does not necessarily follow that the amounts used in computing the total damages are published in the award. In all cases the court need only mention the total sum of damages in its judgment without going into details, and there need be no mention of the National Insurance benefits taken into account.

This new Act also alters the law known as "common employment." This has concerned cases where a wrongful act of an employee has caused injury to another employee, the law having operated so that an employer could not be made to pay damages in such circumstances. It is specifically laid down by the 1948 Act, however, that in cases where an employer is sued in respect of personal injuries caused by the negligence of a person employed by him, the fact that that person was, at the time the injuries were caused, in common employment with the person injured shall not constitute a defence for the employer, so the legal doctrine of "common employment" ends. No "contracting out" from the foregoing provision by any agreement between an employer and employee can have any legal effect, the 1948 Act providing that any measure which would remove the liability of an employer in such circumstances, inserted in a contract of service or apprenticeship, shall be void, and this applies whether the contract was entered into before or after the commencement of the Act (*i.e.* June 30, 1948).

The Employers' Liability Act, 1880, which dealt with some "common employment" matters, is repealed with the passing of this 1948 Act.

Sausages and Small Goods

THOSE interested in small goods production will welcome the appearance of the third edition of Mr. Gerrard's practical handbook,* especially as the second edition has been out of print for some time.

Following the pattern of the previous editions, this book supplies a general outline of the methods commonly employed in the small factory. As the writer mentions in his preface to the first edition, this volume should assist the humble sausage to attain the status it deserves and enjoys in other countries.

The practical aspects of the manufacturing processes are treated in a simple fashion, assuming that the average reader does not possess an unduly advanced technical knowledge.

The chapter on equipment and its maintenance contains some valuable information and is enhanced by some useful illustrations, while that on small factory layout should help the small-scale operator.

As suggested by the title, the subject of sausages occupies a good part of the book, and recipes for typical English varieties and also the Continental and American types are given.

The important subject of utilisation of waste for by-products is also covered, and in an appendix are contained the Statutory Rules and Orders relating to meat products.

* *Sausage and Small Goods Production*. By Frank Gerrard, M.Inst.M., M.Inst.R., M.R.San.I. Third edition. Pp. 208+xvi. Leonard Hill, London. Price 15s. net.

News from the Industry

FORTHCOMING EVENTS

Amino Acids Symposium

Registration forms for the "Amino Acids Symposium," which is being held by the Food Group of the Society of Chemical Industry from September 28 to 30, can be obtained from: "Amino Acids Symposium," The Society of Chemical Industry, 56, Victoria Street, London, S.W.1. The Symposium is open to non-members.

*

British Industries Fair, 1950

The next British Industries Fair will be held in London and Birmingham from May 8 to 19, 1950.

As at previous Fairs, certain trade associations are co-operating with the Commercial Relations and Export Department in the organisation of trade sections by arranging uniform schemes of presentation, and exhibitors in the sections concerned are asked to co-operate in the special arrangements being made. These arrangements are open to all exhibitors in those sections whether or not they are members of the particular trade associations.

*

Sales Management Conference

Ways and means of inducing British industry as a whole to manage sales in accordance with an intelligent forecast of consumer requirements will be discussed by sales managers at the four sessions of the fourteenth annual conference of the Incorporated Sales Managers' Association to be held at Gleneagles Hotel, Perthshire, from October 7 to 10. Members who cannot attend the conference are invited to send a note of their views to the director so that they can be passed on to the chairman of the session concerned.

*

British Food Fair

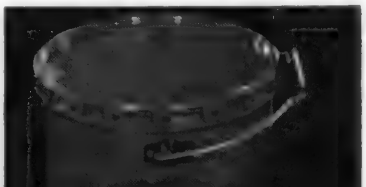
Every aspect of British food manufacturing "from the harvest to the home" will be covered by the British Food Fair which is to be staged at Olympia in September, 1950, by the Food Manufacturers' Federation.

Participation will not be restricted to firms who are members of the Federation or its affiliated bodies, but will be open to all who have products and processes of high merit to display to the consumer. Exhibitors will be encouraged not to rely upon static displays, but to present their products with every possible emphasis on movement and the demonstration of processes of selection, manufacture, testing, and packing.

The Fair will include special features of informative value presented in entertaining style; there will be sections for food machinery and other ancillary exhibits.

Removable Pail Handles

In order to make the package more compact and thus reduce shipping space, a method by which the handles of their U.S. type pail can be packed separately and easily assembled to the pails at their destination has recently been patented by Reads.



The two ears, to which the handle is attached, are grooved on opposite sides of and adjacent to the holes pierced in the centre. To assemble the handle, the ends of which are hooked, one end of the handle is slid along the groove until it enters the hole in the ear. The handle is then turned to the other side of the pail and the other end of the handle is slid along the groove until it also locks inside the ear.

Once the handle is moved to the vertical carrying position, the shapes of the grooves in the two ears are deformed, preventing the handle ends from becoming detached, and holding them firmly in position.

Clean Food Campaign

The catering division of the British Tourist and Holidays Board has launched its 1949 Clean Food Campaign in support of the catering industry.

The first phase of the campaign opened in June last year when plaques and posters calling the attention of all engaged in the industry to the need of scrupulous cleanliness were despatched to industrial canteens and other catering establishments.

The second phase of the campaign reinforces the lessons of the first and places particular emphasis on observing simple rules of personal hygiene, the importance of using really hot water for washing-up purposes, and on the possible danger to health from infection carried by flies.

Plaques and posters are again being used and, as before, the approach will be to managements and staff.

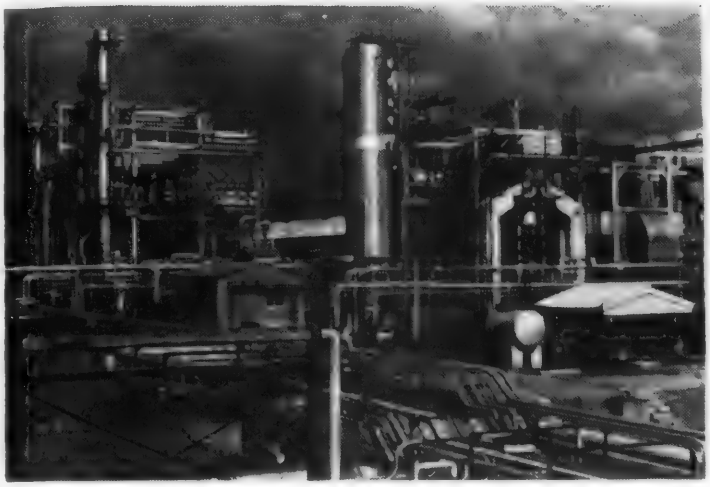
The campaign has the full support of the Ministries and local and public bodies concerned with food hygiene.

John Innes Horticultural Institution

An account of the studies and achievements of the pomology, genetics, cytology, and garden departments of the John Innes Horticultural Institution is contained in the thirty-ninth annual report for 1948.

Work on the use of artificial light has established that it will have useful applications as an aid for the raising of early and out-of-season crops. Studies have been made to determine the effect on the quality of plant growth of different methods of raising tomatoes and lettuces, and comparisons have been made between the growth of tomato and cauliflower in clay pots and soil blocks.

A summer school was again held last year, assistance was given in the revision of the Ministry of Agriculture's leaflet on *Sweet Corn*, and the Institution participated in consultations with the Agricultural Improvement Council on the development of investigations into the genetical problems of seed production.



General view of the hydrocarbon fractionation unit and (*right*) the cracking plant.

Modern Refining Plant at Stanlow

CHEMICALS FROM PETROLEUM

The need for a petroleum-based chemical industry in the U.K. has been fully recognised and there are several plants now nearing completion. One of the first to commence operations is the four million pound Shell chemical solvents plant at Stanlow in Cheshire, which will have an annual production of some 24,000 tons of various types of solvents.

The plant itself consists essentially of a thermal "cracker," together with units specially designed to deal with the "cracked" products by fractionation, hydrogenation and polymerisation, synthesis, and distillation, as well as a number of reactors and converters. Operation is continuous and, with control highly centralised and automatic, the productivity per worker will be among the highest in any industry in Britain.

The basic raw material for the plant is gas oil, and this is "cracked" under carefully controlled conditions of high temperature and low pressure to give a high yield of hydrocarbons containing three and four carbon atoms. These fractions include a very high proportion of the olefines, propylene (C_3 stream), and butylene (C_4 stream) which, when separated, form the feedstocks for the manufacture of the solvents and other chemicals now being produced at Stanlow. The new refinery, at present under construction alongside the existing plants, is designed to refine two and a half million tons a year of crude oil from non-dollar sources and will, when complete, provide these feedstocks without the necessity for special cracking.

The range of solvents at present being produced is:

From propylene: (from the C_3 stream)	Isopropyl alcohol; isopropyl ether; acetone; diacetone alcohol; mesityl oxide; methyl isobutyl ketone.
From butylene: (from the C_4 stream)	Secondary butyl alcohol; methyl ethyl ketone.

These products can be divided into three types—ketones, alcohols, and ethers; each type has many industrial uses.

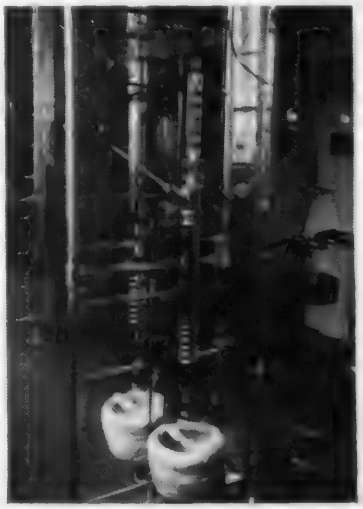
Of the alcohols, isopropyl alcohol is perhaps of the most immediate interest. Besides being used as a latent solvent for lacquers, it is employed for many extraction purposes such as the manufacture of flavouring essences from fruit and other natural products. It is useful in the food processing industry as a dehydrating agent for starch and gelatine, and as a precipitant in the extraction of pectin from citrus fruit.

An interesting product of side reactions occurring during the formation of isopropyl alcohol is isopropyl ether. This compound, having a lower volatility than ethyl ether, is of particular value as an extraction solvent.

The availability of a range of low, medium, and high boiling ketones which are excellent solvents for vinyl resins will assist in providing a wider and improved range of lacquers for use in the manufacture of containers for the food industry. In addition, these solvents are useful in the production of nitrocellulose lacquers, transparent wrappers, and special printing inks, high gloss label coatings, paper container linings, and bottle cap coatings.

The chemicals to be produced at the new plant provide, for the food industry, a valuable addition to the existing range of Shell products. Foremost among the latter is the detergent "Teepol," manufactured at a nearby plant on the Stanlow refinery, which typifies another very important class of chemicals derived from petroleum —the synthetic detergents.

Although these chemical solvents compete in certain industrial fields with those derived from other sources, the potential demand is vast, and petroleum-derived chemicals have certain technical advantages which should prove of great value, particularly to the surface-coating and allied industries.



Laboratory distillation equipment.

Malt Products in Food

The number of foods in which malt products are being incorporated is increasing, and Edward Fison's, who have been associated with malt for over a century, have recently announced the introduction of a new range of "Fiona" malt products to meet this demand. These products comprise a variety of malt syrups, malt flours, and dried malt extract powders, in which the starch and proteins of the original malt are presented in simplified and readily digested forms.

These foods contain valuable sugars, dextrins, proteins, and vitamins, but apart from their nutritive qualities, they are used for their sweetening power, colour, and aromatic flavour, all of which can be developed to different degrees. Similarly the power of enzymic malt products to degrade starch and protein to sugar and amino acid is a valuable one.

Apart from their long established use in beer, bread, and infant foods, malt products are now employed in the manufacture of biscuits, breakfast cereals, milk beverages, and sugar confectionery. More recent applications include those in pickles, sauces and vinegars, as well as malted dairy products such as cheese, custard, and ice cream.

Alkathene film for packaging food.

Layflat Tube for Food Packaging

A reception took place recently at the Park Lane Hotel in order to introduce a development of Alkathene film for packaging in the form of a layflat tube. This thin-walled, seamless tube possesses all the physical and chemical properties of the I.C.I. brand of polythene, and is of particular interest for the packaging of foodstuffs in view of its impermeability, transparency, light weight, and behaviour at extreme temperatures. The film is already in use as a packaging material and the advent of the layflat tube will greatly simplify the job of converting the film into packages, closed by heat sealing.

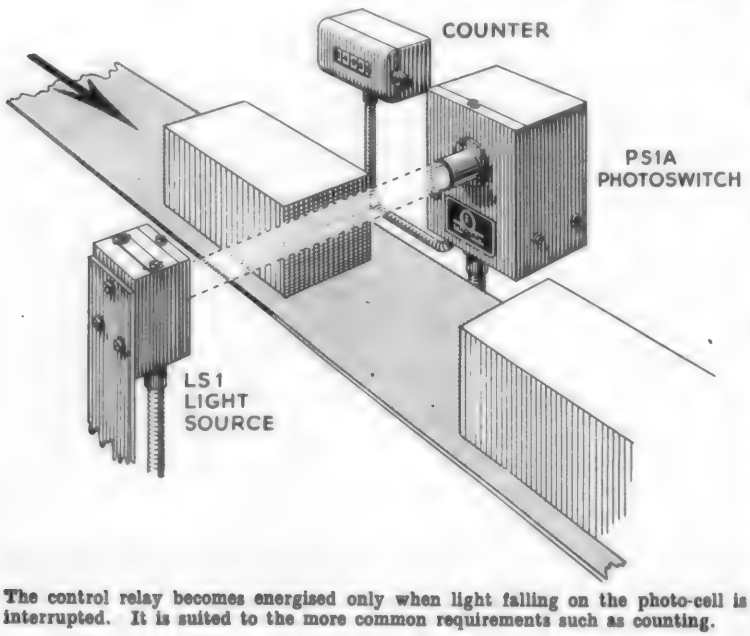
The present range of layflat tubes is being increased to include widths from 2 in. to 24 in. (*i.e.* 1·27 in. to 15·7 in tube diameters) and thicknesses from 0·0015 in. to 0·005 in. Large-scale production capacity will be ready by the beginning of 1950.

The introduction of the layflat tube coincides with the coming into operation of the first large-scale plant for the production of the film in Great Britain and the Plastics Division of I.C.I. can now supply it in continuous rolls up to 46 in. in width.

Electronic Control

A range of industrial electronic control devices which are adaptable to most common uses and can serve as basic components in more complicated control systems are described in a booklet *Elcontrol Aids to Production*. The devices include micro-switches, weld timers, interval and cyclic interval switches, photo-electric scanners, and photoswitch control amplifiers, as well as general purpose photoswitch controls intended for all applications in which it is required to initiate electrical power switching by interrupting a beam of light.

Of particular interest to food manufacturers is an automatic floatless liquid level control which may be used to provide a high or low level warning, or to control the operation of valves and pumps in the filling or emptying of tanks. A number of units may be used jointly to proportion different liquids entering a mixing vat. For this purpose stainless steel probes would be adjusted to the desired levels so that as each liquid reached a probe tip at its maximum level, it would serve to switch off further supply and to open a valve to admit the next liquid to the tank, and so on. The equipment is also applicable to the control of foams and highly aerated substances which formerly could not be dealt with automatically.



The control relay becomes energised only when light falling on the photo-cell is interrupted. It is suited to the more common requirements such as counting.

Crop Protection Congress

PLEA FOR ADEQUATE CONTROL MEASURES

At the Congress dinner and dance at the May Fair Hotel.

The terrible losses of crops and the means available to counter them formed the subject of Lord Bledisloe's Presidential Address when he opened the Second International Congress of Crop Protection held in London from July 20 to 30.

During the course of his address, members were warned against thinking too closely along the lines of chemical control and should remember that biological and physiological factors, including inheritance, must be considered as well.

Increased production and reduction in losses were the two main essentials in view of the rise in world population and standard of living. To give some idea of crop losses, Lord Bledisloe said that in the United Kingdom alone the loss of potatoes from blight was about 10 per cent. or one million tons of valuable starchy food per annum. Even after harvesting, there was a loss of stored potatoes in a clamp amounting on an average in the last fifteen years to as much as 8 per cent.

Some effort must be made by those responsible for crop protection to stake out claims for material, money, and men in the different branches of crop protection. Research should be concentrated on finding readily saleable products, whereas from the aspect of international food, the important point was to continue finding funds for research into alternative methods of crop protection.

Concluding his address, Lord Bledisloe said that he looked upon the staggering size of the preventable loss of the world's crops as a challenge to science.

The full programme of scientific papers and discussions which followed covered insecticides, fungicides, plant growth regulators, toxicology of crop protection substances, methods of application, and analytical methods and standardisation. Other meetings comprised excursions and works visits.

Lord Bledisloe.

During the course of the Congress an informal reception was held at the Trocadero, followed the next day by the President's reception at the Dorchester. On July 22 members attended a garden party offered by H.M. Government at Lancaster House. The Congress dinner and dance was held at the May Fair Hotel on July 27, the closing ceremony taking place on Thursday, July 28, at the Royal Institution.

New Fluorescent Lighting Type

Exhibited recently at the British Electrical Power Convention Exhibition held in Torquay, a new Flurolier has been produced to provide illumination of vertical surfaces, slides of large machines, chalk boards, and vehicle assembly lines, etc. Known as the "G" type, which is an angle version of the "F" type also produced by Benjamin Electric, the Flurolier is finished in "Crysteel" vitreous enamel, and is suitable for continuous runs, while it will also take the standard "F" type visor cover.

Tin Research

The activities of the Institute during the period of recovery after the war, and the wider activities envisaged for the future, including more extensive research facilities and improved technical service for the tin consuming industries, are reviewed in the illustrated *Report on the Work of the Tin Research Institute, 1947-1948.*

Research on electro-tinning has been intensified. A new planting bath is being investigated and affords a wider range of current densities than has hitherto been possible with still solutions.

New offices where technical experts are available for consultation and practical assistance on any problems concerned with the uses of tin have been opened in Belgium and the United States of America.

Success of Bakery Demonstrations

The growing interest of the bakery trade in demonstrations is indicated by figures issued by the Unilever Bakery Service for their 1948-1949 season. The average attendance at a demonstration showed a 30 per cent. increase over the previous year, and nearly 13,000 bakers in all saw the demonstrations.

It is significant of the trade's desire for more attractively finished goods that the most successful demonstration of the Bakery Service has been the "New Style of Decoration."

Outstanding shows include afternoon and evening sessions at Manchester when 282 bakers were present. The season also saw the Bakery Service's first visit to Northern Ireland since 1939.

Brewers' Casks

Vats of many different sizes and shapes, ranging from small bulge or cask-shaped vats to 9-gallon brewers' casks, are made at the works of David Roberts and Son, coopers, back and vat makers, and stave importers, where the ancient trade of vat making from oak, softwoods, and many other kinds of wood is carried on. Patentees of "Seljon" casks, the firm have patented a recent invention relating to casks consisting of staves made in two layers for economy and additional insulation. The firm are also the sole makers of cask lacquer.

Company Reorganisation

Following the reorganisation of the company earlier this year, Bastian and Allen have acquired new premises at Harrow, thus enabling the manufacture of their electrode boilers, water heaters, etc., to be carried on under one roof. The new premises also house the head office and technical departments, the London and Nottingham works and the head office at Bedford Square having been closed at the end of July.

The company's new address is: Ferndale Terrace, Harrow, Middlesex. Telephone: Underhill 0440.

Sugar Dealers' Resolution

At a general meeting of the United Kingdom Wholesale Sugar Dealers' Association, held in London recently, it was resolved:

> This Association is unanimously opposed to the nationalisation of the sugar industry. The record of the industry and of the distribution of sugar under free enterprise is one of progress, efficiency, and economy, and has been singularly free from criticism. The Association is convinced that progress, efficiency, and economy would deteriorate as a result of nationalisation, and the interests of all consumers at home and abroad would suffer.

Mr. E. E. Percival, chairman of the Association, which represents all the leading sugar distributors in the United Kingdom and Northern Ireland, said that the views of members could not be over-emphasised. They were all convinced that nationalisation of the sugar refining industry would inevitably lead to disastrous results.

Appointments

Mr. C. H. Pellow has been appointed manager, southern area, of Benjamin Electric. Mr. Pellow joined the company in 1939 as sales engineer and recently returned from a tour of Australia in connexion with his company's export market.

■

Mr. Albert Lord, B.A., has recently been appointed to the packaging research staff of Patra to work on that part of packaging research concerned with the strength of packages. This work calls for study of the breakages which occur in transit, with a view to relating the types of breakage to the hazards undergone by packages, and then reproducing the hazards in laboratory tests which will predict the treatment suffered by packages in their journeys by road, rail, sea, and air.

Lord Borwick Retires

The retirement of Lord Borwick, chairman of George Borwick and Sons, has been announced by the board of directors; he is succeeded by Mr. D. V. House, F.C.M.A.

Lord Borwick joined the board in January, 1919, becoming chairman in 1939, and it was during his period of office that the centenary of the firm was celebrated.

In December, 1940, the company's factory was completely burnt out and the manufacture of baking powder was carried on in a building in the grounds of Lord Borwick's estate near Pangbourne. Two new factories have since been purchased and fully re-equipped.

Lecture on Soya Flour

"Soya Flour from the Baker's Angle" was the subject of a recent lecture demonstration given by Mr. Frank Longworth, technical adviser to British Soya Products, to the Lewisham district Master Bakers' and Confectioners' Association.

Corn Flakes' Silver Jubilee

Celebrating with more than 2,000 employees and their families at Manchester recently was Mr. W. H. Vanderploeg, President of the parent company, over from the U.S.A. specially for the silver jubilee of the Kellogg Company of Great Britain.

During the prize-giving ceremony Mr. Harry McEvoy, managing director of the British company, announced that basic rates of pay would be increased by 10 per cent. with immediate effect. He forecast that if the increased production of the company could be maintained, and if there were no increase in the price of raw materials, it would be possible to reduce the price to the consumer of at least one size of corn flakes.

1949 Census of Production

It has now been decided, after consultation with the Census of Production Advisory Committee, that information for the Census of Production for the year 1949 shall be collected in less detail than that collected for the year 1948.

For 1949, the main change is dispensing with detailed particulars of the sales of goods made or of materials purchased. The output and materials sections are being simplified as far as possible and for most trades only one total value for output and for materials will be required; in certain cases, one or two other totals which were asked for in 1948 (*e.g.* duty paid in the year) will be repeated so as to allow net output to be calculated. Only one total figure will be required for work given out, and the sections on payments for services rendered by other firms (*e.g.* advertising, research) and an analysis of sales will be omitted.

Although these simplifications will be made for 1949, details similar to those asked for in 1948, particularly for the sections on materials purchased and output, will be required at future censuses. Firms are therefore advised to maintain the records of their business which enabled them to complete the census forms for 1948.

The statutory forms to be completed for the Census of Production for 1949 will be issued to all firms concerned on January 1, 1950.

Equipment for the Food Industry

PROCESS CONTROL DEVELOPMENTS

A prominent feature on the stand of Vickers-Armstrongs in the Grand Hall section of the Engineering and Marine Exhibition, which is being held at Olympia from August 5 to September 10, is the "Super-Forty" bottle filling machine designed for the brewing industry. Bottles are filled and crowned under the most hygienic conditions, the filling level may be varied while the machine is running, filling is dripless with the filling tubes sealed at the lower ends, and the machine can be washed out with scalding water and sterilised with steam.

An example of the range of cardboard box and wire stitching machinery made by the firm is the "Empire" 20 in. wire stitcher for stitching rigid cardboard boxes which can be seen in operation. Other items include a working exhibit of a "VSG" hydraulic variable speed transmission gear, a steering gear operated by a "VSG" pump, and a selection of hydraulic valves suitable for dealing with high pressure and in applications where meticulous control is essential.

Self-honing hydraulic control valve for hydraulic presses.

A new self-honing hydraulic control valve, designed primarily for the control of hydraulic presses or high pressure water systems, is being shown for the first time on the stand of George Ellison.

The valve is of the screw-down pattern with special features that allow foreign matter to pass between the seating faces when the valve is closing, instead of becoming embedded to cause scoring and "flow-cutting." It is so constructed that it must be moved some distance from the "fully closed" position before it opens, thus permitting a mechanical interlock to be fitted that prevents the simultaneous opening of the pressure and exhaust valves and further prevents the waste of pressure fluid.

Nickel alloys with particular emphasis on heat- and corrosion-resisting materials, are demonstrated on the stand of Henry Wiggin and Co.

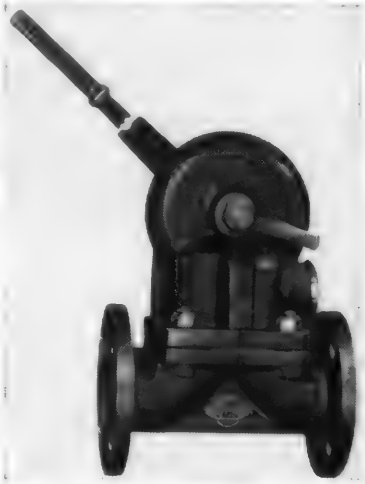
Among these are the Nimonic series of nickel-chromium alloys, Monel, K Monel, pure nickel, Inconel, Wilco-Wiggin Thermometals, and the Nilo series of nickel-iron alloys. The exhibits further include examples of seamless tubing, and there is also available a comprehensive range of literature dealing with properties and the fabrication of the alloys.

How nickel alloys can assist designers and engineers by supplying special combinations of properties for service in different fields is the theme of the stand of the Mond Nickel Co., where development and research department staff are present to give advice on metallurgical problems.

A simple pilot plant to demonstrate the company's recent development of electro-pneumatic process controls is installed on the stand of Evershed and Vignoles in the National Hall. Instruments on view include a high pressure stainless steel flow meter, a new design of displacer type liquid level transmitter, and a number of circular disc type recorders which are being shown for the first time.

Other apparatus for distant indication and control, and a new range of testing instruments including the new series four range of Megger testers comprising insulation, combined insulation and continuity, earth, and earthometer testers, can also be seen.

Examples of the various adaptations of the Saunders diaphragm valve are included in a pipeline installation under water pressure at the company's Grand Hall stand. The features of the diaphragm valve, in conjunction with a straight-through full bore, are incorporated in a new type K valve which is demonstrated by cut-open models. This new valve can be readily "rodded-through" to break up and set in motion obstructions from the solidification of certain fluids or their suspensions during manufacturing processes.



Quick action diaphragm valve with lever control in place of usual hand wheel.

Other exhibits on this stand include examples of cocks, spherical plugs, taper plugs, and non-return valves, while centrifugal pumps are prominently displayed. Among the static exhibits is a new self-priming pump with electric "unishaft" drive, a self-contained Diesel engined pump, a belt drive set, and a bare-shaft pump.

New Wrappers for Foodstuffs

Produced on a Canadian machine which cuts, prints, and glues automatically, new open-ended corrugated wrapping materials made from any weight of paper and square, round, or oblong in shape are to be manufactured by Corrugated Wrappers (Hanwell), a subsidiary of Hygrade Corrugated Cases. The wrappers, which can have any design using not more than two colours printed on the outside, offer many possibilities for packaging foodstuffs.

Company News

Not only a record increase, but also the highest turnover in the history of the company was announced by the chairman, Lord Luke, at the forty-ninth annual general meeting of Virol. New and improved machinery was to be installed so that when raw materials were more plentiful, it would be possible to meet all demands.

After payment of the preference dividend, the directors recommended a dividend of 17½ per cent. on the ordinary shares, the same as that paid in 1948.

▪

At the twenty-eighth annual ordinary general meeting of The Metal Box Company, Sir Robert Barlow, chairman, told shareholders that the shortage of tinplate continued to impede their development in this country.

The company had benefited by developing outlets overseas for their technical knowledge, and the prospects of their interests abroad were most encouraging.

The report and accounts were unanimously adopted and a final dividend of 15 per cent., less tax, making 20 per cent. less tax for the year, was approved.

▪

An order book full and flowing over was reported by Sir Herbert E. Morgan, chairman of Smith's Potato Crisps, when he presided over the twentieth ordinary general meeting of the company. The supply for the public had for a long time been inadequate but a gradual improvement as raw materials and labour became available was foreseen.

Out of the balance of £173,926, the directors recommended the payment of a final dividend of 20 per cent. and a cash bonus of 5 per cent., both less tax, which, together with the interim dividend of 7½ per cent. already paid, made a total of 32½ per cent.

▪

At the thirty-third annual general meeting of the H. J. Heinz Company, the chairman, Mr. H. J. Heinz II, stated that the forecast made in 1948 had been realised and that sales in terms of both tonnage and value were the largest in the history of the British business. Export sales exceeded all their pre-war experience.

OBITER DICTA

● Old age pensioners prefer weak tea to beer.—*Dr. Edith Summerskill.*

● Who conducts palatability tests on whale meat, and do they have a whale of a time?—*Mr. Renton, M.P.*

● We have a proverb that "fine words butter no parsnips." Pious opinions move no groundnuts.—*Lord Milverton.*

● If we can get so much disease from milk, let us be thankful for alcohol in which we don't get any germs.—*J. F. Knott Craig, Deputy Mayor of Paarl.*

● When I gets indigestion I takes a dose of this yer carbonated soda what they puts in when cooking the greens. That cures me.—*A Devon farmer.*

● The only way to get bigger meat rations is to review the meat industry from top to bottom.—*Captain Macgillivray, President of the British Shorthorn Society.*

● If British industry is to hold its own, we had better get back as quickly as possible to firm prices and fixed delivery dates, and then keep them.—*Mr. E. A. Carpenter, President of the Manchester Chamber of Commerce.*

● White bread is made from bleached flour which is poisonous to the human system, and that accounts for a lot of little things which the doctor has to try and put right later.—*Correspondent to "News Review."*

● It's rather wonderful to think that bugs and beetles have had success in getting us together in amicable discussion where politicians have failed.—*Lord Lucas to delegates from thirty nations at the Second International Crop Protection Congress.*

● Because of more than forty years of education, advertising, and merchandising, we have learned to want things. It is the satisfaction of these wants far beyond our needs that gives America the highest standards of living ever known. If it weren't for these wants, the big beautiful super-markets in the food field could probably get by with 100 items, but they need 3,000 additional items to satisfy the consumers' wants.—*Mr. R. Shapira, addressing America's National Dairy Council.*

The sales of the Australian subsidiary showed an increase of 27 per cent., establishing a new record despite continued severe restrictions on the use of tinplate and shortages of ingredients, particularly dairy products.

▪

The increase in trade of Energen Foods Co. mentioned in the chairman's statement last year has continued, and another record year has been achieved. The company's export trade could be greatly developed but, as home demand is based upon medical necessities, it has been decided to serve these requirements first.

The trading profit is being used to pay a final dividend of 15 per cent., making 30 per cent. for the year on the capital issued.

Booklets Received

An account of the first Convention of the Industrial Association of Wales and Monmouthshire is contained in a recent issue of *Industrial Wales*, the journal of the Association. Interesting articles also published include a report on the U.S. market and its relation to Wales, and an account of the second annual general meeting of the Association.

▪

A useful four-page pamphlet, setting out the qualifications necessary for membership and giving precise details of what the Institution can do for the individual works and plant engineer, has been issued by the Institution of Incorporated Plant Engineers.

The aims of the Institution and the facilities extended to members have a great bearing on industrial productivity; industrial managements and their engineers will find the pamphlet of particular interest.

▪

Fan engineering did not exist in this country or Europe and was only in its infancy in the U.S.A. when the Sturtevant Engineering Company was founded in 1884, and a new British industry started. The company recently celebrated the 50th anniversary of its incorporation as a limited company and to mark the occasion has produced a well-illustrated catalogue which describes in an overall manner the systems and products which the company install.

World Food News

New Macaroni Drying Machine

A new, fully automatic macaroni drying machine has made its appearance in Italy. The macaroni hangs on rods fixed in special frames inside a totally enclosed structure. These rods are moved in combined and alternating vertical and horizontal directions by means of an electric motor. Thus the long macaroni is provided with the same ventilation and thermic conditions as exist already in rotating machines for short types.

During their movement the macaroni is continuously subjected to a vertical thermo-conditioned flow of air blown by a fan through a heater consisting of a system of pipes filled with boiling water. There is also a special device which expels the moist air from the machine.

The machine is capable of drying 1·8 to 2 tons of macaroni every twenty-four hours.

U.S. Plant Breeding Expansion

Since 1945, the U.S. Department of Agriculture has sent abroad five expeditions in search of plant specimens that might become valuable in American agriculture.

All five expeditions returned to the U.S. early in 1949, having sent home or brought with them more than 12,000 germ plasms, *i.e.* any seed, root, or tuber from which a new plant can be produced. From these, American plant specialists are now trying to breed new varieties that either yield more or are more resistant to disease and insects than related plants at present grown in the U.S. The new germ plasms include cereals, fruits, vegetables, forage and fibre plants, potatoes, and peanuts.

The newly arrived plant or germ plasm is first quarantine-tested. When it is certain that the plant is healthy, it is used to produce original stock for experimental breeding purposes. This stock is sent to a number of experimental farms, where it is tested in many types of soils and under different climatic conditions. If desired values are discovered, the plants are used as parents of a new variety, or are crossbred with other American varieties.

£2 Million White Bread Subsidy

According to a recent statement made by the South African Minister of Agriculture, it is costing the Government nearly £2 million a year to give the country white bread. White bread was introduced about nine months ago after the country had been provided only with the standard brown loaf bread for eight years.

South Africa produces some four million bags of wheat annually, and about three million bags have to be imported.

Pick-up Pack

A novel American pack which makes the carrying of fragile products easy and safe has recently been produced. Known as the "Sure Handle" box, this regular, straight tuck box is delivered flat to the customer and can be glued and pre-folded in one operation. The handle of the box remains flat against the Cellophane window until perforations are loosened, and is not easily torn or damaged in normal packing or shipping operations.

The new pack solves such problems as that of keeping fragile items of food safe from crushing, and is of particular interest to the baking industry, ice cream manufacturers, and frozen food packers.

When the product arrives in the store, the handle can be lifted to draw attention to the feature, or it can be left flat until the item is sold since handles are plainly labelled.

No extra board is needed to form the handle, which is cut from board normally wasted in cutting out the transparent window.

New Paint for Wine Tanks

The annual waxing and dewaxing of fermenting tanks used in South Australia's wine industry has now been made unnecessary by the production of a new paint that serves the same purpose as the wax, but which is much more durable.

This paint, which is being made in a factory in Adelaide, has a synthetic resin base, with a special solvent. It is claimed that it will resist a dry heat of up to 500° C. and is highly resistant to corrosion. It has many possible uses in the chemical industry.

Irish Company Expansion

The Garryowen bacon factory has been purchased by Clover Meats, of Waterford. In 1939 and previous years, when the pig supply position was normal, the average killings in the Garryowen factory were 65,000 pigs a year, and employees numbered 160, as compared with the 60 engaged at present.

Clover Meats have also purchased the Dublin premises of Marmion and Company, wholesale provision merchants, which they intend to use as a distribution depot for their many products.

Two years ago they bought the interest in the Wexford bacon factory, which they have since been running as an auxiliary to their Waterford industry.

Food Plant for Bolivia

A Supreme Decree (No. 1578) has been passed in La Paz signalising the use to be made of moneys belonging to the Committee of Small Agriculturalists of Cobija (Pando). Among the uses specified are the acquisition of two complete factories and accessories for the extraction of oil from Brazil nuts, each factory to consist of two hundred small hand-operated machines called "hullers" (*descascaradores*), and the purchase, transport, and installation in Cobija of rice peelers (*peladores*) and mills.

Firms interested in supplying these items should send catalogues to the Banco Agricola de Bolivia, Seccion Tecnica, La Paz.

Mr. Henderson (*left*) on the stand of the Chase Equipment Corporation (associate company of the Automatic Weighing and Packing Machine Co.) at the Packaging Exhibition in Atlantic City, U.S.A.

Indian Fruit Industry

The Indian fruit industry's claim for a subsidy from the Government for development purposes has been rejected by the Indian Tariff Board although the industry has been granted protection till March 31, 1951.

The Government, however, will be compelled to consider withdrawal of protection if no marked improvement is made by the industry in complying with the fruits products control order. Sanitary conditions in many factories are far from satisfactory, and as many as 40 per cent. of the 295 licensed factories are in unhygienic premises.

The Board's recommendations, most of which have been accepted by the Government, include improvement in the mechanical equipment and manufacturing processes of the bigger factories, formulation of a co-ordinated policy for grading and marketing of fruits, employment of six experts to give advice to fruit preservers, creation of a fund by the sugar industry for granting rebates on sugar prices to the industry, and making it obligatory that all requirements of the defence services for food products should be met from indigenous manufactures, provided these products conform to certain standard specifications.

State-controlled Shops for South Africa

The South African Government has announced its intention of establishing state-controlled shops in the larger centres of the Union to supply essential foodstuffs in short supply to the poorer sections of the population. This will be an extension of the mobile van service which has been in operation since 1944. All the margarine produced in the Union has been distributed hitherto through these channels.

U.S. List of Standard Samples

An up-to-date list of standard samples issued or in preparation by the National Bureau of Standards, U.S. Department of Commerce, has been produced. These standards have been established during the past forty years to meet the constantly increasing needs of industrial and research laboratories.

Representative uses of the Bureau's standard samples include the checking of chemical and instrumental methods of analysis; developing new methods of analysis; calibration of spectrometers, spectrographs, *p*H meters, calorimeters, pyrometers, and polarimeters; and settlement and avoidance of disputes between buyers and sellers.

Certification of Foodstuffs

The Commercial Secretariat to H.M. Embassy at Caracas has forwarded a translation of a Venezuelan communication to the effect that it will be sufficient if shipments of foodstuffs are accompanied by a certificate of purity, issued by competent authorities in the United Kingdom, certifying that the foodsuffs in question have been declared suitable for consumption in the country of origin.

Dutch Freezing Plant

With an annual capacity of about 6,000 tons of food, a new freezing plant for fresh vegetables, fruit, fish, poultry, and dairy products has been opened at Zandaman. Pre-cooked meals will be an important part of the output of the new plant, and a new freezing process called "Arctic Storm" will be used.

A two-year contract has been concluded with a British firm to whom 3,000 tons of food will be supplied in the first year of operating.

Meals will be prepared at the new plant for the Royal Dutch Airlines, and contracts have also been placed by the American authorities in Germany. The entire output will be exported for the time being.

Australia Expands Plans for Flying Beef

Experiments in flying beef from inland Western Australia to the coast have been so successful that a similar scheme may be introduced in Queensland. The first test flights showed that carcasses could be carried by air at economic rates, and a new aviation company (Air Beef Proprietary Limited) is now freighting 27,000 lb. weight of beef a day over a distance of 170 miles to Wyndham for shipment.

Australian National Airways, which holds one-third of the shares in the new company, is considering a similar enterprise to bring beef to the coast from isolated grazing areas in Northern Queensland. It is believed that, by the middle of 1950, an experimental unit could be operating, probably flying beef from the Cape York Peninsula to Cairns and Townsville.

Citrus Production in S. Africa

It is estimated that the present season's crop of citrus in South Africa will exceed the last year's crop by about 3 million pockets and that there will be about four million cases available for export.

Edinburgh Firm to Open Plant in Canada

Plans for the setting up of a subsidiary manufacturing plant at Montreal which will be the only Scottish flavouring extract firm to operate in Canada have recently been completed by the Edinburgh Essence Company. This venture is part of the expansion scheme of the company, whose products have been sold in Canada for some time. When the new plant starts operating, it is hoped to make high-quality products to cater for Canadian tastes at a more competitive price.

Rice Production in British Guiana

Under the Economic Co-operation Administration's technical assistance programme, two United States agricultural experts with experience of modern methods of rice cultivation and milling are paying a three months' visit to British Guiana to help the local government increase the Colony's production of rice.

The experts, who left the U.S.A. by air recently, are Mr. Henry M. Beachell, associate agronomist in rice production and breeding, U.S. Bureau of Plant Industry, and Mr. O. B. Brown, a farm management specialist with the Arkansas Agricultural Extension Service.

While in British Guiana, the experts will assist in preparing a report on the local rice industry. It will include recommendations on measures to improve rice production, on areas where its cultivation can be most economically extended, the most efficient methods for developing new rice farms, the re-organisation of milling facilities, and the use of mechanical equipment for rice production. In their study, the experts will take account of the British Guiana Government's plans for draining and irrigating new areas for rice farms. Present plans call for the irrigation of about 82,500 acres of land along the coast.

Nigeria's Industrial Growth

WORK OF DEPT. OF COMMERCE AND INDUSTRIES

Although colonial economics are based primarily on the production of agricultural crops and minerals for export, part of the present programme of economic development in a number of colonial territories also makes provision for an expansion of secondary industries. A typical example of this new growth is taking place in Nigeria, where, under the Colony's Ten-Year Development Plan, many schemes are in progress to develop internal trade and local industries. These new activities are under the control of the Nigerian Department of Commerce and Industries, an official organisation set up in 1946 "to assist, to advise and, where necessary, to participate in such economic improvements and developments as may be decided upon."

The work of the Department falls under two main heads. On the one hand there is the creation and expansion by modern methods of a number of local industries, with benefits to internal trade, and secondly, the Department has now absorbed the duties of import and export licensing, food control, and oil and transport control.

The Department is fostering numerous smaller enterprises including local fruit production and a fruit juice industry, a food canning factory, brick and tile manufacturing, and an expansion of the local sugar industry. Many applications for loans in connexion with commercial and industrial projects have been received by the Local Development Board, and these are referred to the Department for investigation. Suggestions for the development of local industries are also received from administrative officers requiring advice on technical problems or on ways and means of making the best use of local raw materials.

Research and surveys are being carried out in all fields, but it is emphasised that while grants under the Ten-Year-Development Plan have helped to start these local industries, the future rate of progress will depend largely on local private investment.

Italy Promotes Oil Production

A ten-year programme for the development of olive growing in Italy, especially in the southern half of the country, has been worked out by a special Oils and Fats Committee, instituted at the Italian Ministry of Agriculture in order to promote the production of alimentary oils.

It is estimated that this programme, which is based on the extension of the area occupied by olive groves, improvement of the yield per acre, and replacement of the old trees by young, will increase the output of olive oil by 8,000 tons by 1953, and by 25,000 tons during the following five or six years.

During the current financial year 127 million lire of ERP funds will be used to enable olive growers to plant new trees and carry out grafting.

The Committee has also prepared a supplementary five-year programme covering other oleaginous plants such as rapeseed, colza, and sunflower.

Cherry De-stoning Machine

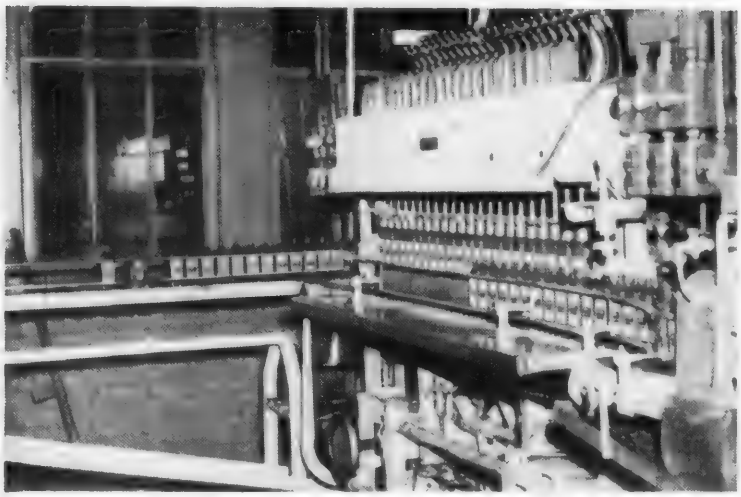
A new Swiss machine, capable of de-stoning about 1,500 kilos of cherries per hour, is being used by a Swiss agricultural co-operative society to prepare cherries for the preserve industry.

A conveyor belt, provided with holes the size of average cherries, takes the fruit to a set of metal pins for de-stoning. The fruit is sold in paraffin-coated cardboard containers.

Possible Food Market in Panama

It has been reported that there is an unsatisfied demand for foodstuffs, jams, preserves, and confectionery in Panama, and that United Kingdom manufacturers and exporters might find it to their advantage to investigate the possibilities of the market.

Exporters are reminded that Panama is an American Account country; there are no import restrictions and no exchange difficulties.



Pneumatic's automatic vacuum filler in operation at the Glaser-Crandell company's plant in Chicago. Hot sauce is being filled into 5 oz. containers.

New Lard Antioxidant

A new antioxidant to keep edible fats and oils from becoming rancid is said to be an unusually potent, high purity grade of butyl-hydroxyanisole. Lard will remain in good condition for a year or more when protected by this product, it is claimed.

Being very soluble in oils, it is easy to apply. It may be added to lard or other fat either in crystal form or in solution and will dissolve immediately, so that it is only necessary to see that it is thoroughly mixed with the fat. The product possesses the remarkable property of carrying through the baking process and protecting finished baked goods against rancidity. Most lards can be made storage stable at a very small cost. The antioxidant does not impart any detectable colour, odour, or flavour to fats or oils.

The concentration of the product needed to make lard storage stable and give adequate carry through into baked goods is approximately 0·01 per cent. or 1 lb. to 10,000 lb. of lard. Where carry through is not required many lards can be given adequate storage life with as little as 0·0025 per cent.

When used in lard its effectiveness should be checked by the active oxygen method or use of the Schaal oven. The antioxidant is furnished in two forms, as a crystalline solid and in solution with propylene glycol with propyl gallate and citric acid.

World's Chief Source of Almonds

Up to June last, Italy exported some 21,000 tons of shelled almonds. The chief importers were Great Britain with 7,074 tons, the U.S.A. with 4,281 tons, and France with 645 tons, the rest being distributed between Canada, Austria, and Switzerland. Italy has therefore once more acquired the position of the world's chief exporter of shelled almonds.

Modern Bakery wanted in Lebanon

An enquiry for a complete modern bakery capable of producing sandwich sliced bread, roll bread, and ordinary bread, all packed separately with paper stamped with the name of the factory, has been received from Joseph Tamraz et Fils, Place des Canons, Beirut.

The firm would like to have a plan for a bakery capable of an output of at least 10 tons of bread in eight hours, with automatic equipment and an electric oven. As the local electrical supply cannot provide the necessary current, a generator capable of supplying the complete bakery will also be required.

United Kingdom manufacturers who are interested in this enquiry are requested to communicate direct with Joseph Tamraz et Fils, supplying outline specifications and details of plant they can offer with approximate prices and delivery periods.

Food Processing Facilities for Caribbeans

A new canning plant, capable of producing 600 cases daily, has been put into operation at Eleuthera in the Bahamas. Initially, the plant has been handling whole tomatoes, juice, and paste; when these are out of season, the plant will switch over to the pineapple crop.

At Paramaribo in Surinam a new factory has been established for the manufacture of jams and preserves from local fruit, and it is hoped that production will soon render unnecessary the importation of these products.

Mellon Research Institute

Enzyme studies commenced during the year ended February 28, 1949, have enabled the preparation of several hydrolysates that offer definite possibilities for improving the flavour and nutritive values of foods, it is reported in the thirty-sixth annual report of the Mellon Institute, 1948-1949. Research has been undertaken to find a reliable and reproducible method for the determination of nitrate and nitrite ions in heterogeneous food mixtures, and an investigation has been made of problems involved in the determination of biological values of proteins. "Synthad," the synthetic granular absorbent for sugar refining, has been subjected to full-scale comparison with bone char which confirmed the superior abrasion resistance of the new absorbent.

The hydrolysis of sucrose in creams has been investigated, the effect of *p*H and composition upon the rate of the reaction being studied in particular; in addition, research has been conducted on all properties of gelatine as a whipping agent and on their improvement.

Experimental malting procedures conducive to the greatest possible yields of the highest quality malts have been evolved, while developmental work has broadened the domain of industrial applications for chemicals and allied products derived from corn. Studies have been made to improve the colour and other characteristics of soybean protein dispersions, and basic research in silicones and organosilicon chemistry has been expanded.

Italian Fruitgrowers' Congress

Under the auspices of the local Chamber of Commerce and other institutions, the Third National Fruitgrowers' Congress will be held in Ferrara in October next. The first of these Congresses took place 24 years ago, the second being two years later.

The programme of the Congress will include a show of late fruit and of equipment used in fruit growing; saplings; fertilisers; packing, etc.

Delegates to the Congress will be able to visit the chief fruit-growing estates and fruit preserving factories.

India's Sugar Industry

Protection of India's sugar industry is to continue till March 31 next year, pending a further enquiry. The Indian Tariff Board, which examined the industry's case, recommended that protection be continued until March, 1951.

The Government of India is appointing an expert committee to examine the present costs of production of cane, to review the progress of cane research and development, and to suggest methods to achieve quicker results in increasing the yield of sugar per acre with a view to reducing the cost of production.

Meat Extract Production in Italy

At present about 75 per cent. of Italian meat extract factories are closed and the surviving firms are finding it difficult to maintain production. This is due partly to the comparative abundance of meat in the country and partly to the fact that during the war "meat extracts" were not made from meat and the products are now regarded with suspicion.

Recently the producers of mixed meat and vegetable extracts have been permitted to import from abroad pure meat extracts and it is hoped that this may help to revive the industry.

News from the Ministries

Pickles and Sauces

The Pickles and Sauces Order, 1947, has been revoked. The main effects of this revocation will be as follows:

1. Licences to manufacture pickles and sauces will no longer be required.
2. The special labelling provisions in the Pickles and Sauces Order will no longer apply, but the labelling of pickles and sauces will continue to be subject, as at present, to the provisions of the Labelling of Food Order.

Danish Bacon

Discussions between the representatives of the British Ministry of Food and the Bacon Board of the Danish Ministry of Agriculture were held in Copenhagen from July 25 to 29 for the purpose of fixing the price of bacon exported from Denmark to Great Britain during the period commencing October 1, 1949.

The Bacon Agreement stipulated that the period to be covered by the discussion should be the twelve months October, 1949, to September, 1950, but it was agreed that this period should be extended to the end of 1950.

The following prices have been fixed:

For the three months October to December, 1949, the same as that ruling for the twelve months October, 1948, to September, 1949, *i.e.* 225s. per cwt. f.o.b. For the calendar year 1950: 217s. per cwt. f.o.b.

Sugar Corporation Appointment

Lt.-Col. Sir Francis Humphrys, G.C.M.G., G.C.V.O., K.B.E., C.I.E., who has given up the chairmanship of the British Sugar Corporation which he has held since the establishment of the Corporation in 1936, is succeeded by Sir Alan Saunders, K.B.E.

New Food Hygiene Advisory Officer

Mr. Morley T. Parry, Chief Sanitary Inspector to the County Borough of Northampton, has been appointed Food Hygiene Advisory Officer.

Mr. Parry's duties include visiting local authorities and advising them on their food hygiene problems. He works under the direction of Dr. W. A. Lethem, the Ministry's Principal Medical Officer, and his address is: Ministry of Food, 47, Portman Square, London, W.1.

Fruit Juice Content

The Soft Drinks Order, 1947, has been further amended, with effect from July 31, to provide for the minimum fruit juice content of lime juice and soda to be 48 fluid ounces per 10 gallons of finished beverage, instead of 80 fluid ounces as at present. This has been done because it has been found that the higher fruit juice content made the beverage too tart for the average customer.

Canned Meat and Meat Products

The Order amending the Meat Products and Canned Meat (Control and Maximum Prices) Order, 1948, which came into force on July 17, allows meat fat to be used in the manufacture of whale meat, vegetable, or fish products without bringing these products within the definition of "meat products." The order does not allow whale meat to be mixed with other meat in any meat product. To obtain supplies of fat, trade users will still have to hold a buying permit or other authority from the Minister of Food under the Oils and Fats Control Order, 1949.

Exports without Licence

All fresh vegetables, except potatoes, together with certain kinds of fresh fruit and hops, can be exported without licence under The Export of Goods (Control) (Amendment) (No. 4) Order, 1949.

Among other goods which will no longer require export licences are: certain types of rags, barytes, phthalic acid esters, urea and its salts, gallic acid, pyrogallol, salicylic acid, and sodium salicylate.

Acetic acid, acetic anhydride, and butyl alcohol have been added to the list for which export licences are required.

The Order also gives statutory effect to the changes in the arrangements for sending gift parcels abroad.

Dry Coffee Extract

Because supplies are now plentiful, the Minister of Food has revoked the Coffee Essence Control Order, 1942, as amended, to release the manufacture and sale of dry coffee extract from price and other controls.

Bread Subsidy

For all subsidised bread, the rate of subsidy in England and Wales will be increased by 8d. per sack with effect from February 9, 1949, and, provisionally, by 1s. 3½d. per sack with effect from March 27, 1949. The provisional rate of subsidy from March 27 will then be 9s. 0½d. per sack.

The trade's accountants are examining a proposal made by the Ministry for mitigating the effect of the interval between the period of the accounts and the date when rates can be adjusted. When this examination has been completed, further discussions will take place between trade representatives and the Ministry to settle finally the rate of subsidy from March 27.

The rate of subsidy in Scotland will be increased by 2s. 2½d. per sack from May 22, 1949. The rate of subsidy will then be 10s. 7d. per sack.

Sugar for Bees

Beekeepers may obtain a maximum allowance of 10 lb. of sugar per colony between August 1, 1949 and January 31, 1950. This allowance, together with the stores of honey which beekeepers should leave in the hives at the end of the season, is for winter feeding. Beekeepers who drew the advance allowance of 5 lb. last April will only be entitled to a maximum of 5 lb. of sugar per colony for winter feeding.

Applications for permits must be made during the period August 1, 1949 to January 31, 1950 on the official application form obtainable at local food offices. The completed form should be countersigned by a responsible person and returned by the applicant to the food office.

An additional maximum allowance of 5 lb. of sugar per colony for spring feeding, which can be drawn with the winter allowance, will be made available between February 1 and June 30, 1950.

Fish Allocations

The Fish (Port Allocation) Order, 1949, which re-enacts with amendments the Fish (Port Allocation) Order, 1943, came into force on July 18.

The main object of the new Order is to make it clear that anyone landing fish in a specified area must offer it for auction at the first auction sale after landing. Other changes are as follows:

1. Imported boxed fish, fish not subject to price control and crews' "frys," and similar perquisites are exempt from allocation.
2. The list of specified areas and Port Allocation Committees has been brought up to date.
3. Provision is made for granting allocations to newly licensed traders.

More U.K. Goods for Italy

The Anglo-Italian Joint Economic Committee held its fourth meeting in London from July 4 to 15. The Committee reviewed the balance of payments and the course of trade between the two countries in the light of the programme agreed at meetings in Rome in February and May of this year, and some further increases in both directions above the previously agreed programme were agreed upon. The Anglo-Italian Payments Agreement of November 26, 1948, which had expired on June 30, was renewed until December 31, 1949.

The Italian Government have agreed to grant licences for United Kingdom manufactured goods substantially above the level agreed in February, 1949. The quotas now agreed will cover the period January 1, 1949 to June 30, 1950. The following commodities are among those in which important increases have been made:

Tea; beef casings; laboratory and industrial glassware; special resistance wires and tapes; scientific instruments other than electrical; electronic equipment; rolling mill equipment; cardboard box and carton making machinery; wrapping and packing machinery; ball and roller bearings of types not produced in Italy; industrial refrigerators and refrigerating plant; milking and milk pasteurisation and conserving machinery; machinery for pasteurising and conserving fruit juice; office machinery; insecticides; prepared drugs and pharmaceutical preparations; chemicals for industrial use; laminated structural plastic panels.

In addition the Italian Government have agreed to license further commodities for which no quotas have previously been granted; these items include:

Mustard; sugar confectionery; aluminium paste; latex compounds.

United Kingdom purchases of Italian foodstuffs will be a little more than was envisaged in February, 1949, and limited additional imports of Italian manufactured goods will be licensed by the U.K. authorities.

The Italian Government have also agreed to extend to certain types of industrial plant, equipment, and machinery, when they are imported from the United Kingdom, credit facilities similar to those at present extended to imports from the U.S.A. under the E.R.P. system. These credits will cover goods up to a total value of £10 million.

Sardines from Yugoslavia

Agreement has been reached in London with representatives of the Government of Yugoslavia for the purchase by the Ministry of Food of 80,000 cases (eight million tins) of sardines of the 1949 pack.

The first shipment will leave Yugoslavia in September and supplies will be on sale in this country next year.

Egg Prices

Following the temporary reduction in the price of eggs during the flush season, the Ministry of Food has now amended the Eggs (Great Britain) Order, 1949, and the Eggs (Northern Ireland), Order, 1949, to increase the maximum wholesale and retail prices of eggs by a 1d. per egg from July 25, 1949.

Nuts and Dried Figs

Almonds and filberts in shell from Cyprus, and dried figs from France, French North Africa, Greece, Spain, and Turkey can now be imported without the obtainment of an individual import licence.

The nuts must be grown in, as well as consigned from, Cyprus.

The figs must be pressed and packed in containers not exceeding 2 lb. net weight.

Information and Advice

Marshmallow

B.3577. *Could you inform us of a method of preparation of marshmallow which would not be sticky in hot climates?* (Jamaica.)

You might make up the following formula as a basis for trial:

	lb.
Granulated sugar	340
Starch	14
Glycerine	$2\frac{1}{2}$
Gelatine	$5\frac{3}{4}$
Water	125
Cream of tartar	$\frac{1}{2}$
Soda	$\frac{1}{4}$

The gelatine is dissolved in 22 lb. of the water (warm). The sugar, with the rest of the water, is placed in a steam jacketed pan and brought up to a temperature of 107° C. The cream of tartar is then added, mixing well, and the temperature of the mixture maintained at the same level for twenty minutes. The steam is then turned off and the soda added. The starch is thoroughly mixed in and the dissolved gelatine added, after which the mixture is placed in a cooling vessel. When cool, the mixture is beaten to the desired consistency, the glycerine being added slowly at the same time.

Red Currants for Jelly

B.3550. *What is the best procedure for extracting red currant juice, and is it possible to can this juice and store it for jelly-making at a later date?* (Canada.)

Red currants for jelly are preferably harvested when fully mature in order to obtain the finest flavour. They should be thoroughly washed while still on the stem and then passed through a stemming machine. Stemming before boiling is the usual practice, but there are some varieties in which the stems do not impart too much tannic acid to the product. Practice is also variable as to whether the currants are milled at this stage in a grater or hammer mill or whether they are left whole.

The fruit is boiled in a steam jacketed pan with the addition of some water. A fruit to water ratio of 1 : 1 has been recommended as the most economical proportion. When lower proportions of water are used a second extraction of the pomace may be necessary to secure a good recovery of pectin, colour, and flavour. After boiling for five to ten minutes the juice is extracted from the pulp in a rack and cloth hydraulic press. The pulp is inclined to be slimy in consistency and to assist pressing it is advisable to add about 3 per cent. of a coarse filter aid to the pulp, to place only a small amount of pulp in each press cloth, and to apply the hydraulic pressure slowly.

The juice is immediately clarified. A succession of operations is found to give the most efficient removal of suspended matter; for instance, the juice is screened, then allowed to settle, the clear layer is centrifuged, heated again to boiling point and filtered brilliantly clear in a pad filter or a filter press with the addition of a filter aid.

Red currant jelly is best made from freshly expressed juice, but it is possible to can the juice for later manufacture into jelly. Better practice would be to can whole berry pulp and press as required for jelly-making. Both for berries and juice, well-lacquered cans are necessary to avoid discoloration of the product by the action of dissolved tin on the anthocynin pigments and to avoid corrosion spoilage. The process recommended is to fill the product at 190°-195° F. into cans, preferably made from tinplate having a coating weight of 1·5 lb. per base box and coated with a high quality fruit juice lacquer; the cans should then be closed and held on their sides for five minutes before cooling. If cold storage facilities are available, the best method for storing red currant juice for later jelly manufacture is to freeze it in casks and hold at 0° F.

Information Supplied

B.3547. *Producers of fish albumen concentrate.* (Norway.)

B.3549. *Manufacturers of lemon curd.* (South Africa.)

B.3551. *Suppliers of vitamin oil concentrates.* (Yorks.)

B.3553. *Suppliers of whey powder and egg albumen.* (London.)

B.3554. *Suppliers of continuous retorts.* (Beds.)

B.3555. *Suppliers of glucose or corn syrup.* (N. Ireland.)

B.3557. *Suppliers of soluble coffee.* (Surrey.)

B.3559. *Suppliers of potato peeling machinery.* (Essex.)

B.3560. *Manufacturers of candy-making machinery.* (U.S.A.)

B.3562. *Suppliers of extruding machinery.* (Hants.)

B.3563. *Suppliers of methyl cellulose.* (Sussex.)

B.3571. *Suppliers of powdered gelatine colours and flavours.* (Yorks.)

B.3574. *Suppliers of electric refrigerating drinking fountains.* (Lancs.)

B.3583. *Suppliers of dulcin.* (Northumberland.)

B.3585. *Manufacturers of net weighing machines.* (London.)

B.3586. *Suppliers of monosodium glutamate, makers of crushing rolls, suppliers of corn syrup, makers of shredding machines for liquorice root, and makers of coffee mills.* (Worcs.)

B.3587. *Manufacturers of candied peel.* (Lancs.)

B.3588. *Suppliers of flavouring and colours.* (Yorks.)

B.3589. *Makers of pie and tart machines, suppliers of machinery for inserting the jam in doughnuts, and suppliers of spaghetti rolling and filling machines.* (Lancs.)

B.3590. *Manufacturers of rubber emulsions for the canning industry.* (Egypt.)

Information Required

B.3601. *Suppliers of milk powder substitute.* (Kent.)

Recent Patents

622,551. JAMIN, N. V. C.: Method of making biscuits consisting of differently coloured doughs and biscuits made according to this method.
622,597. MINIMAX, LTD., YOUNG, A., and YOUNG, E. F.: Apparatus for making infusions of coffee and the like, applicable to other purposes.
622,628. NYROP, J. E.: Production of chocolate and cocoa powder.
622,630. RASMUSSEN, K. K. J.: Means for aiding in the picking of fruit and the like.
622,647. TOLEDO SCALE CO.: Meat chopping machines.
622,683. BARRETT, E.: Mincing or slicing device, particularly for poultry or like foods.
622,852. ANHANGER, O.: Fully or semi-automatic frying machines for food products such as minced fish or meat, fish fillets, and the like.
622,912. KAEHLER, A. A.: Manufacture of a soya bean food preparation and food products containing it.

Abstract of a Recent Specification

Preservation and Packaging of Food

Formerly, foods such as cooked vegetables, soups, fruits, meats, fish, fowl, and the like have been preserved by sterilising them by heat and hermetically sealing them in metal cans and glass jars. Industry has largely used metal cans for the preserving of foods, while in the home glass containers are generally used.

Metal containers and glass containers are rigid, and after sealing there is usually a vacuum or a subatmospheric pressure within the container, so that a difference in pressure exists between the inside and the outside of the container. This difference of pressure is conducive to leakage and spoilage of the food, which is encountered to a greater or less degree depending on the care and skill employed in sealing the containers, especially when the process is carried out in the home.

Food so prepared and packaged in sterile condition will retain its freshness over extended periods of storage, even at room temperatures.

The present invention comprises the method of preserving foods which involves heating food to sterilising temperatures thus causing water vapour to emerge above its surface, introducing a predetermined amount of hot and sterile food into a flexible-walled impervious container to leave a substantial head space filled with water vapour emerging from the food, and then hermetically sealing the container, whereby upon cooling of the food and condensation of the vapour the upper portions of the walls of the container will be collapsed by the atmospheric pressure.

The invention also comprises a method of preserving food which involves introducing a measured amount of food into a flexible-walled container constituted at least in the inner face thereof of a fluid-tight and fusible material to leave a substantial head space, the material having a temperature of fusion considerably higher than the cooking and sterilising temperature of the food, subjecting the food in the container to cooking and sterilising temperatures to cause water vapour to fill the head space, bringing the mouth portions of the container into flattened face to face relation, and then autogenously and hermetically sealing the mouth portions while the container is still filled with water vapour, whereby upon cooling of the food and condensation of the vapour the walls of the container around the head space will be collapsed and a hermetically sealed sterile food package substantially free from air is obtained.

616,789. *Harry Franklin Waters.*

Recent patents have been selected from the "Official Journal of Patents" and are published by permission of the Controller of H.M.S.O.

Trade Marks

PROTENUM.—661,148. Preparations, in powder form, composed of non-fat milk solids, calcium caseinate, carbohydrate, and flavourings, for use as ingredients in foods. **Johnson and Company** (a Corporation organised under the laws of the State of Indiana, United States of America), Ohio Street and St. Joseph Avenue, Evansville, State of Indiana, United States of America; Manufacturers.
FRAX FRATTERS.—665,149. Food preparations consisting of a filling of cooked meat, game, fish, poultry, vegetables or fruits in a casing of pastry. **H. Read, Limited,** Prospex Works, 71, Rigby Street, Higher Broughton, Salford, 7; Manufacturers.
COMBIREX.—668,216. Machines for kneading dough and mixing machines for use in making cakes and confectionery. **Jakob Lips,** Urdorf, near Zurich, Switzerland; Manufacturer.
GRILLO.—669,723. Edible oils and edible fats. **Parkinsons, Limited,** Curzon Street Drug Mill, Curzon Street, Burnley, Lancashire; Manufacturing Chemists.
PEARLYCELLI.—670,835. Semolina. **Nourishment (York), Limited,** 61-65, Ambrose Street, York; Manufacturers.
TRISTA.—671,610. Non-medicated confectionery. **E. A. Brown and Sons (Rock Manufacturers), Limited,** 74A, Castle Street, Grimsby, Lincolnshire; Manufacturers.

Trade marks have been selected from the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

New Companies

Woolleys (Bakeries), Limited. (467439.) High Street, Barrow-on-Humber, Lincs. To carry on business of biscuit manufacturers, bakers, etc. Nom. cap.: £15,000 in £1 shares. Dirs.: E. Woolley, Nokomis, Brigg Road, Barrow-on-Humber, Lincs; C. E. Woolley, Highfield, Barrow-on-Humber, Lincs; Mrs. L. E. Woolley, Mrs. M. L. Woolley, and Mrs. A. Woolley.

Robert Hartley (Colne), Limited. (467488.) Queen Bakery, Nicholas Street, Colne. To carry on business of bakers and confectioners, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: R. Hartley (permt. mang. dir.) and Bertha Hartley, Rookwood, Trawden, near Colne.

W. J. Topham and Co. Limited. (467553.) 178, Sharrow Lane, Sheffield, 1. To carry on business of bakers, confectioners, caterers, etc. Nom. cap.: £3,000 in £1 shares. Dirs.: W. J. Topham, 5, Mount Carmel Street, Derby (permt. gov. dir.); M. W. Bagnall, 10, Vernon Delph, Crosspool, Sheffield.

Crispie Products (Southern), Limited. (467575.) 330, Addington Square, S.E.5. To carry on business of makers and sellers of extracts from cereals and/or fruits, etc. Nom. cap.: £100 in £1 shares. Dirs.: H. A. Finn, 4, Vallance Gardens, Hove; L. Pyle 33A, Addington Square, S.E.5.

Health Food Products (Pont Street), Limited. (467584.) Nom. cap.: £100 in £1 shares. Dirs.: to be appointed by subs.: C. Jobson, 80, Brook Street, W.1 (solr.); A. Spahlinger, 38, Pont Street, S.W.1.

John Rigg, Limited. (467592.) 50, Stockport Road, Ardwick, Manchester, 12. To carry on business of bakers, caterers, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: J. Rigg, 1, Redclyffe Avenue, Victoria Park, Manchester; G. Rigg, 167, Greengate Street, Barrow-in-Furness.

Powell's Bakeries (London), Limited. (467608.) 485, London Road, Westcliff-on-Sea. Nom. cap.: £100 in 6s. 8d. shares. Dirs.: W. J. Powell and Mary C. A. Powell, 166, Manor Park Road, Harlesden, N.W. 10; F. J. H. Powell and Eileen G. M. Cimicud.

Baker's St. John's Lane Bakeries, Limited. (467625.) 96, St. John's Lane, Totterdown, Bristol. To take over business carried on at Totterdown, Bristol, by Ernest A. Baker. Nom. cap.: £10,000 in £1 shares. Dirs.: E. A. Baker and Mrs. R. A. Baker (both permt.), 2, St. David's Road, Wells Road, Knowle, Bristol; Miss J. V. Redman, Westgrove, Grange Road, Bishopsworth, Bristol.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.